RAILROAD GAZETTE

FRIDAY, DECEMBER 14, 1877.

Tests of Axles.

The following is the report made at the last convention of the Master Car-Builders' Association, by Mr. W. E. Chamberlain, of the Boston & Albany Railroad. The figures which illustrate it are one-half the actual size:

For the last six or seven years some of the members of this Association have often discussed the cause of hot journals and broken axles, and at our rooms in New York for the last four years, at almost every monthly meeting, questions of every conceivable shape have been asked, but nothing definite determined upon. There are a great many causes for hot journals, and I am inclined to think from past experiments, many of them cannot be detected by the naked eye.

Some six years ago I commenced a series of experiments with grease, plumbago, oils and brasses, and have often become puzzled at the results of the experiments.

The mode of operation in testing iron by etching is as follows: Cut the piece smooth on the end, and put it in an earthern dish, in which has been placed one half chemically pure muriatic acid, and one-half distilled soft water, enough of the acid and water being put in to make it about three-eighths of an inch deep; also throw in a little glass broken up fine, which will allow the acid to circulate freely under the iron, then let it stay in the acid two and one-half hours, after which take it out and print it, which is done by simply rubbing a roller saturated with printer's or lithographer's ink across the end that has been etched, placing a sheet of white paper over it, and putting it in a common letter press. I find it is well to take an impression before etching, because if there are any imperfections in the iron they will show themselves. For instance, see cut No. 13.

The testing machine is nothing but a pair of scales of which a cut will be furnished at some future time. Cuts Nos. 1, 2, 3 and 4 were axles broken, and taken from under foreign cars. No. 1 broke off close to the inside of the hub of the wheel; No. 2 found broken off on the outside of the hub next to the box; No. 3 showed a defect 1¼ inches from the inside of the hub; we raised the axle on blocking so as the wheel would clear the track, and struck it as hard as a man could strike with a twenty pound sledge, four blows, and the axle fell off. No. 4 was found broken off at the inside collar of journal; the size of journal on No. 4 was $6\frac{1}{2} \times 3\frac{1}{2}$ in. After etching I concluded it would be useless to try the tensile strength but took the strength of the iron across the axle.

No. 1 broke at		35,270 lbs.	per square inch.
" 2	"	37,840	" "
" 3	"	44,225	" "
" 4	"	23,125	" "

No. 5 was a line axle running between New York and Boston, and ran 250,000 miles. I do not attempt to give the quantity of oil used, because I expect to give it in some future report, when I shall have had time to more thoroughly prove my experiments, to know they are correct. Tensile strength of No. 5, 55,000 lbs. per square inch. No. 6 ran 50,000 miles and never ran cool, though repacked almost daily until it became so hot I concluded to take it out. The color of the solid iron was a dark blue, while the light strips, or imperfect iron, were a light gray color, and projected slightly above the solid iron surface. Original size of journal $3\frac{1}{4} \times 5\frac{1}{4}$ in. There was considerable brass found in the box ground to a powder, and thoroughly mixed with the oil and waste, the waste looked as though it had been ground to powder in a mill, and formed a paste; under the microscope, it was found that the light strips or imperfect iron looked like knife blades, and projected beyond the dark surface, and at every revolution would grind out the brass, and pick up the waste and grind it between the journal and brass. The tensile strength of the axle crosswise was found to be 32,550 lbs. per square inch, it being useless to take the strength of the iron lengthwise.

No. 7 is one of four steel axles that ran 309,000 miles, and to my knowledge never ran hot, or even warm. The original size of journal when put in was $3\frac{1}{4} \times 5\frac{1}{4}$ in. and when taken out, was $3\frac{7}{16} \times 5\frac{11}{16}$ in. The tensile strength was 68,360 lbs. per square inch, showing after the fracture a very tough, fibrous metal, and under the microscope looked like a mountain of ice crystals clinging to one another.

No. 8, steel axle, ran 248,000 miles, and warmed up a number of times, although it was well lubricated. This journal was found to be worn egg-shape. Original size of journal, $3\frac{1}{4} \times 5\frac{1}{4}$ in. I have no cut representing the egg-shaped journal, because the journal was good; it was being turned up when the discovery was made, and when we had turned it up to the shoulder, we found a flaw running from *a* to *b*, which of course condemned the axle. The tensile strength I took twice from two different places, but the variation was so great I cannot give them accurately.

No. 9, iron axle that ran 227,000 miles, original size of journal, $3\frac{1}{4} \times 5\frac{1}{4}$ in., when taken out, $2\frac{15}{16} \times 6\frac{3}{4}$ in.; tensile strength, 66,500 lbs. per square inch, very tenacious, with long fibres. No. 10, iron axle run 128,500 miles when a flaw was found at *C* and *D*, both running almost the full length of journal, the fibre at *d* being loose, working backward and forward similar to No. 6, the tensile strength at *E* being 68,230 lbs. per square inch, and at *F* 35,200 lbs. The fibres at *E* were long and tenacious, and a nice silver gray color; at *F* the fibre looked like a lot of silver bricks, all points and nothing to hold them together. No. 11, steel axle, ran 97,000 miles. Original size of journal $3\frac{1}{4} \times 5\frac{1}{4}$ in., when taken out $2\frac{15}{16} \times 5\frac{7}{8}$ in., often hot and roughed up, full of flaws and imperfections, and had to be smoothed several times. No. 12, iron axle, ran 192,475 miles, original size of journal, $3\frac{1}{4} \times 5\frac{1}{4}$ in. Unfortunately the brass broke in the centre, and spoiled the journal; size when taken out, $3\frac{1}{16}$ in. at the ends and $2\frac{15}{16}$ in. at the centre; tensile strength, 68,120 lbs. per square inch. Very homogeneous, long fibres which would cling tenaciously together. No. 13, iron axle, original size of journal, $3\frac{1}{4} \times 5\frac{1}{4}$ in.; ran 50,370 miles, hot six times, no imperfections visible, tensile strength 68,422 lbs. per square inch, perfectly homogeneous, long fibres and very tenacious. When the axle was condemned and I had got the tensile strength, I was surprised to find the mileage so small, it being so homogeneous and tenacious. After etching it showed for itself, being made of the very best of material but poorly manufactured.

The experiments above are not altogether satisfactory to myself, because I did not know exactly how to accomplish what I wanted. It requires some little experience before a person can judge correctly the quality of the metal. I have found from experiments that because either steel or iron are homogeneous, it is no criterion that they are fit for car axles. I think they should be homogeneous iron well worked, and of a long fibrous nature, rather than a fine-grained iron; the elongation would show the difference in the tensile strength between the long fibrous and the fine-grained irons. At some future time these experiments will be reported with diagrams, explaining each one more perfectly. I have also been experimenting with the various kinds of iron used on car work, of which I send you cuts, before and after etching. The cuts show for themselves as to the quality of the iron; the tensile strength varied from 16,000 lbs. to 65,000 lbs. per square inch, which proves the fact that the dead weight of cars could be somewhat lessened, by using a good quality of iron. I also send cuts of links and pins before and after etching, which show for themselves whether the iron is of good quality and properly worked, or whether it is an inferior iron and improperly worked. The numbers 45 to 48 inclusive, and 65, 66, 68, 69 and 71 are such links and pins as are constantly found on the railroad track, broken. The tensile strength varied from 15,500 to 59,370 lbs. per square inch.

W. E. CHAMBERLAIN,
Master Car Builder Boston & Albany Railroad.

Fig. 1.

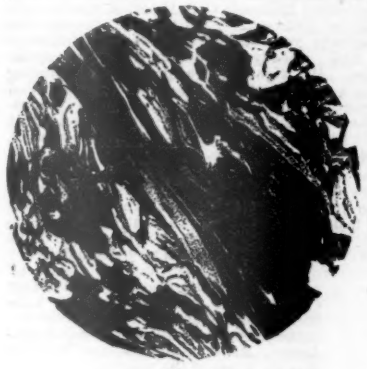


Fig. 2.

Fig. 3.

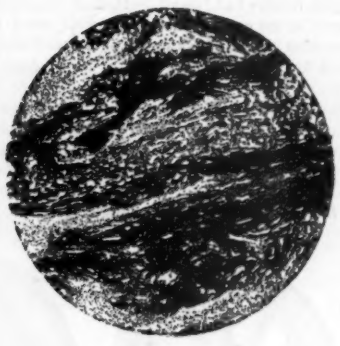


Fig. 4.

Fig. 5.

Fig. 6.

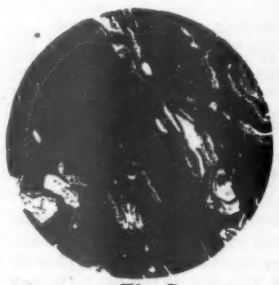


Fig. 7.

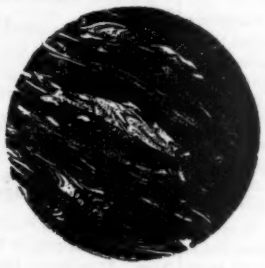


Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

SECTIONS OF CAR-AXLES,

HALF SIZE.

Contributions.

Tools and Machinery for the Construction and Repairs of Permanent Way—A Little Extravagance is not so bad as some of the Worst Cases of Chronic Economy.

TO THE EDITOR OF THE RAILROAD GAZETTE:

If some of our roadmen were to look about and see what manner of tools, instruments and machinery are in use on other roads they would be astonished. Indeed, if all the trackmen in the country should be granted a few days' furlough, and they were to use the time in an inspection of the tools and manner of doing work on other roads, what they would see and learn would be interesting and profitable. While some would be surprised to see the shockingly bad condition of the few tools in use, others would wonder at the great variety and excellent condition as well as the novelty of the implements to be found on some of our well-kept roads. But as it is not at all likely that road-masters and section foremen will be allowed to go to neighboring roads to stare about, for obvious reasons, the following may serve to give a tolerably clear understanding of what would be seen on some roads, or rather what has been seen. Not long since the writer saw a man striving to draw a spike with what might have once been a claw-bar, but it had become sadly demoralized. The tool had become worn and bruised so that it would take only a partial hold of the spike, and after several vain attempts at pulling the spike itself had become worn and gouged by repeated slipping of the bar, each slip gnawing as it were until the spike had no head left, and after being twisted about in all manner of shapes was finally broken off, a portion remaining in the tie. Another man was faith-

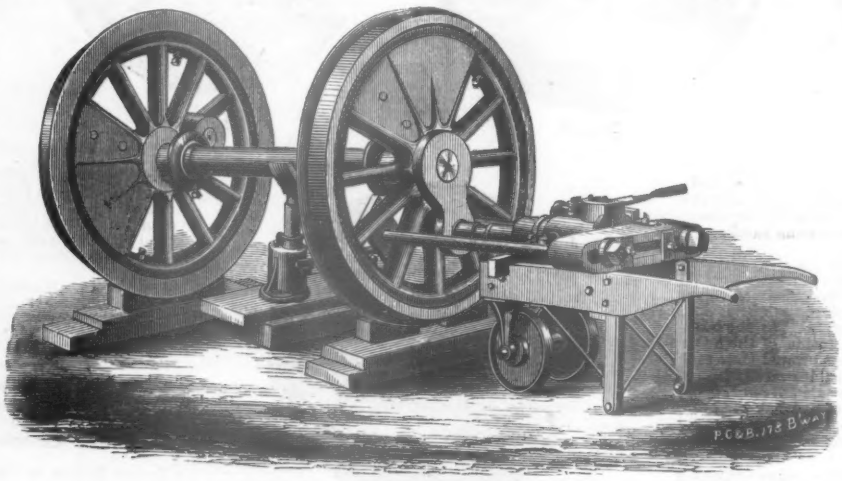
fully serving his employers by knocking about with what some call a "a spike maul." The implement in question had a stub of a handle which was probably about half its original length, and the face (?) of that hammer (or maul, for those who like the name better) resembled a miniature drawing of the ruins of a brick building. Small rectangular pieces had flown from time to time from what had once no doubt been a tolerably smooth, even surface. The first effort, after the spike was made to stand alone, was a powerful blow from which the spike went whizzing away toward the fence. Another spike "set," another blow, and a ragged piece is gouged out of the rail, which received the blow, and the spike is lopped over to one side. It is now righted up, and after a few blows, which are delivered with great care and anxiety, it is driven half its length into the wood, then jammed and bent over into the throat of the rail, resembling the head and neck of a sleeping duck. A glance at the other tools composing the outfit of the gang showed they were in keeping with those already mentioned. Not a tool about the premises, so far as could be seen, was in a fit condition for use, and the men seemed to take hold of their work without any particular regard as to the results of their labors. It was impossible for them to do a good job with the tools they were furnished with, and they seemed to feel indifferent about what they accomplished. This state of things not being in accordance with the common rules of progressive railroading, some inquiries were made to learn why this was thus. It appears that the company had economized (?) by thinning out their men in the repair shops, so that what few were left were from necessity engaged exclusively on rolling stock, and that track tools were sent back without repairs. Some of the most urgent repairs had been done at a private shop until the non-payment by the company put an end to that. The road-master was also division superintendent, and was seldom seen by the track foremen, his duties, being manifold, precluding the possibility of his devoting any of his time for the benefit of the track. Indeed, he appears to be like many others (too many) he does not know where his responsibilities begin or end. Although he carries several titles, he hardly knows how much authority to assume. He may put forth all his energy, and work incessantly, and fret and worry about what he cannot do, but knows should be done. There are hundreds of such cases as this, and probably any experienced railroad officer can readily assign a reason therefor. But the purpose of this article is to urge a reform in supplying track tools, and keeping them in repair. Of course we have thousands of miles of road that "reformed" years ago, but there is yet a wide field for improvement in this respect. When a railroad company is in what may be called straitened circumstances, it cannot afford to set a gang of men at work without good and sufficient tools adapted to the work they are expected to perform. When a man is put to drawing spikes he should be provided with an implement with which he can do it readily, without a waste of time, and without destroying the spikes. Some, or rather many, of the roads are provided with implements for spike-drawing, by which spikes can be drawn from between the rails at switches and at places where it is impossible to reach them with the ordinary claw-bar. By using the rail as a fulcrum spikes can be drawn straight and as quickly from between the rails at the head of a switch as from a single rail, and it is expensive for any railroad company to be without a reasonable supply of these implements. *A shovel* may be considered by some as a tool too insignificant to be worthy of mention, but there is no implement in use in engineering work that outranks that simple and much abused tool in usefulness. And a shovel, like any other tool, should be of a kind adapted to the work it is to do. A light, thin-bladed steel shovel may answer a good purpose in the molder's room of a foundry, but it is next to useless for railroad work; and yet we have hundreds of miles of road literally strewn with broken shovels, many of them not lasting to do a single day's work, when they break and are thrown aside, and very likely another of the same worthless kind is taken in hand, to soon follow it against the fence, into the ditch, or into a pile behind the tool-house. It is a waste of money to buy the thin-bladed, hard steel shovels with the straps riveted to the blade; they are dear at any price and are not intended for railroad work. The standard shovel for railroad work is known as No. 2, cast steel, and they will last until worn out; they never break. For many years a New England manufacturer supplied the demand for these shovels, but others are now producing those said to be equally as good. There is nothing gained in getting an inferior article of tools because they are cheap, for in reality they are the most expensive, and a poor road cannot afford them.

Another cheap but important track tool is the cold chisel. To make a good cold chisel a good article of steel is required, and it must be skillfully manipulated. This tool should be kept in good order, so that a rail can be cut square and clean. A rail bruised and hacked off will not last half so long as one cut without splitting or brooming at the end. It is not uncommon to see a man use up a dozen newly-dressed chisels in cutting a single rail. This may be owing to the material being bad, to bad temper (bad *temper* is the cause of a great many breaks), improper holding of the chisel, bad striking with a bad hammer, or unsteady position and vibration of the rail. Two unskillful or careless men provided with poor tools for cutting rails will destroy and damage enough in half a day to pay for a set of first-class tools and the wages of two good men for a week. And so we might go through with the entire list of track tools, and say with truth that not a few roads are working at a great disadvantage by being supplied with poor tools in the hands of careless workmen. Indeed, the practice of supplying poor tools and not giving the workmen facilities for keeping them in repair will demoralize the best gang of trackmen in the country. They have nothing to encourage them to undertake to do a good job, and they fall into habits of carelessness and indifference; whereas if they were furnished with all needful tools of the first class they would take a pride in doing their work well and a good deal of it.

With many roads the old custom of making their own tools is still followed, but even under the most favorable circumstances this is a matter of doubtful economy. The standard took makers of the day have facilities for turning out work by which they can produce a superior article for much less money than can be done in any ordinary railroad shop. Of course, some of the trunk lines use such an enormous amount of tools that their own consumption will warrant the expense of fitting up and running an establishment of their own; but even in such cases it is a somewhat doubtful economy. At all events, most companies will find it greatly to their advantage to purchase their tools of those who make a specialty of their manufacture. And when once supplied they should have a shop fitted up and stocked exclusively for tool repairs. This shop need not be an expensive affair, but it should be in charge of an expert at dressing and tempering tools. A first-class man at this business is worth his weight in gold to any railroad company employing him.

And, besides the great importance of a reasonable supply of small tools, there are numerous kinds of machinery that should be more generally used in road work than they are. Before taking leave of small tools, however, it may be proper to say here that a level should be brought into every-day use by every section gang. Likewise an instrument for elevating the outer rail on curves—a clinometer. It is impossible to keep a track up to the present standard of American roads without the constant use of these instruments when putting track in surface, and their universal use is recommended. Under the head of "machinery" for doing road work, and which might be more generally used with profit, may be mentioned machines for straightening and curving rails and the apparatus much used for unloading ballast by scraping it off platform cars with the locomotive. And where it is practicable to use the steam excavator for loading ballast it is, in most cases, advisable to do so. Doubtless manufacturers of steam excavators would do well to rent them to companies too poor to buy one, or to such as only need the use of one for a short time. It would seem that a whole outfit for loading, hauling, and distributing ballast would be a good property to rent at this time, when so many need their services and are unable to purchase. Mounted pile drivers, wrecking cars, snow plows, etc., of superior construction, are in use on many roads, but not on enough of them, owing to poverty and false economy. But really, the poorer a road is the greater the necessity for "getting the best." It is not forgotten that there is such a thing as extravagance, but a *little of that* is better than to be eternally harping the old story that "the company is poor and we must economize." It becomes chronic and is bad.

WM. S. HUNTINGTON.



DUDGEON'S PATENT HYDRAULIC CRANK-PIN JACK.

The Buffalo Meeting to Consider Reports of Foreign Cars.

The meeting called by President Standiford and others, to consider the introduction of the plan of reporting the daily mileage and position of individual cars was held, as called, at the Tift House, Buffalo, Dec. 7. The following delegates were present:

A. W. Davies, Car Accountant, Atlantic & Great Western Railroad.
W. H. Harlow, Freight Auditor, European & North American.
James N. Fuller, Car Accountant, Hoosac Tunnel Line.
George H. Weeks, Car Accountant, L. S. & M. S. R. R., C. C. C. & I. R. R., and Dayton Short Line.
John T. Rigney, Car Accountant, Baltimore & Ohio Railroad.
James F. Reekie, General Accountant, Detroit, Lansing & Northern R. R.
W. B. Beamer, Car Accountant, Fort Wayne, Jackson & Saginaw.
C. P. Chesebro, Car Accountant, Wabash Railway.
Geo. C. Mather, Car Accountant, Columbus & Toledo Railroad; also Columbus & Hocking Valley Railroad.
G. C. Breed, Purchasing Agent and President's Secretary, Louisville, Nashville & Great Southern Railway.
H. T. Curd, Auditor same, and representing New Orleans, St. Louis & Chicago Railway by proxy.
John P. Moore, Car Accountant, Chicago & Alton Railroad.
G. K. Cooke, Car Accountant, Erie Railway.
S. C. Annable, Car Accountant, Michigan Central and Detroit & Bay City railroads.
John Hornby, Master of Transportation Eastern Railroad.
W. J. Mulvihill, Car Accountant, C. H. & D., C. R. & C., C. H. & L., and Dayton & Michigan railroads.
John D. Trimmer, General Car Agent, Lehigh Valley, Pennsylvania & New York Canal Company, Geneva, Ithaca & Sayre and Cayuga railroads.
E. P. Miller, Purchasing Agent and Car Accountant, Indianapolis, Bloomington & Western Railroad.
H. R. Payne, Car Accountant, Standard Oil Company.
M. A. Robinson, Manager Union Tank Line.
G. L. Johnson, Car Accountant, Erie & Pacific Despatch.
O. M. Shepard, Assistant General Superintendent, St. Louis & Southeastern Railroad.
E. Young, Auditor of the same.
W. W. Buffum, Car Agent, Lake Shore & Michigan Southern Railway.
W. H. Ristine, Chief Clerk, Empire Line.
J. Farnsworth, Car Accountant, Great Western Despatch.
M. Sweeney, Car Accountant, St. Louis, Iron Mountain & Southern Railroad.
J. H. Fancher, Chief Clerk of General Superintendent of Wabash Railway.
W. H. Allport, Car Accountant, Canada Southern Line.
P. C. Doyle, Superintendent, Buffalo & Southwestern Railroad.
C. W. Cushman, Traveling Car Agent, Lake Shore & Michigan Southern Railway.
James W. Reinhart, Car Accountant, Alleghany Valley, Pittsburgh, Titusville & Buffalo and Buffalo, Corry & Pittsburgh railroads.
F. H. Hannis, Car Accountant, Red Line Transit Company.

The meeting was organized by calling Mr. Breed to the chair, on assuming which he made some remarks in relation to the object of the meeting. At the close of his address, Mr. Sweeney, of the Iron Mountain road, was chosen Secretary, and Mr. Fancher, of the Wabash, Assistant Secretary. Letters were read from A. W. Briggs, of the Illinois Central Railroad; A. J. Speese, of the Philadelphia & Reading Railroad; C. Kelly, of the Ohio & Mississippi Railroad; C. S. Freer, of the Detroit, Eel River & Illinois Railroad. All of them advocate the individual car mileage system. Several of the gentlemen present, who had already tried the system, spoke highly of the same. Mr. Rigney said at present the reporting of car-mileage was a matter of confidence. Mr. Davies replied that he did not want it a matter of confidence alone. No matter how honest the road he thought the system of individual car-mileage would be a check on all errors in mileage reports, as clerks are liable to make mistakes.

After recess, the meeting again assembled, and Mr. Davies was called upon to explain his system of individual mileage. He stated that he would explain for all concerned and not for his own personal benefit. Whereupon he went on to describe it at considerable length, with blanks that had been filled up by actual use.

Mr. Doyle moved that the system already in use on the Cleveland, Columbus, Cincinnati & Indianapolis, the Lake Shore & Michigan Southern, and the Atlantic & Great Western railroads be endorsed. Mr. Curd offered an amendment that the sense of the meeting be that individual car-mileage is both desirable and feasible. Mr. Sweeney spoke in its favor, having used it several months, as did Mr. Mather and Mr. Weeks. The amendment was adopted, and there was no opposition to the original motion, although there were several present that were not authorized to bind their respective roads.

Mr. Chesebro offered the following, which was adopted:

Resolved, That believing fully in the desirability of individual car reports, and being desirous of testing the feasibility of daily interchange of car reports, those who wish for their own satisfaction to test it are requested to give the system a fair and impartial trial between this time and the 26th of April, 1878, in order that we may then vote and act understandingly on this subject.

Mr. Curd moved that the chair be authorized to appoint some one to assign the different roads their respective letter by which they will be known in this interchange of car reports, and also give what information may be requested on the subject. The motion was carried. Mr. Davies was appointed.

A vote of thanks was tendered the proprietors of the Tift House.

Mr. Chesebro offered the following, which was adopted:

Resolved, That this meeting adjourn, and further that the members here be requested, as far as practicable, to meet with the Car Accountants' Association in New York, April 26, 1878, and report the progress made in the trial and cause of individual car reports.

After the close of the meeting the members visited the City Club at the invitation of Mr. Doyle, by whom they were handsomely entertained.

Dudgeon's Crank-Pin Jack.

The engraving represents a very convenient tool for pressing the crank-pins in and out of the driving-wheels of locomotives. It is simply the application of the well-known hydraulic jacks, manufactured by Mr. R. Dudgeon, to this use. The jack or pump is conveniently mounted on what might be called a two-wheeled wheelbarrow, so as to be conveniently portable. The manner of using it is indicated very clearly in the engraving. It can be used for either putting the pins in or taking them out of the wheels. The latter is often attended with great difficulty unless proper tools are provided for the purpose. The operation of the machine is made sufficiently clear by the engraving, without further explanation. The tool will be found very convenient in pressing in crank-pins and will often save much work and annoyance and probably save swearing in taking old ones out. It is manufactured by Mr. R. Dudgeon, the well-known maker of such tools, whose address is No. 24 Columbia street, New York.

The Engineers' Location of the Indian State Railroads.

People who ought to know assure us that the State Railway Department does not carry on its work in a satisfactory manner. In England, undertakings like those it has in hand would progress more rapidly and more surely. English engineers work on a different plan from those of the State Railway Department. In England ground is selected and lines are traced, under the immediate direction of the chief engineer, who uses his own eyes, makes himself personally familiar with the whole field of his labors, and continues throughout the progress of his work in close contact with it. Constantly on the ground, he takes note of all difficulties as they arise,

seizing advantages and meeting obstacles as they present themselves to a view thoroughly conversant with the district, and instructed by the experience of similar phenomena elsewhere. To him it never occurs, in matters of the least consequence, to depend on any judgment but his own, least of all to rely on the reports of subordinates only. In short, the work in hand is designed and governed by the direct agency and actual presence of the chief; in other words, by the person presumed to be the best qualified to devise and control. The Indian practice in general may be described as the reverse of this. What the English engineer pursues in the field in immediate view of his object, the Indian engineer in a great measure hopes to accomplish in his office, through the medium of others. The reports of assistants transmitted through several hands to headquarters, classified and manipulated in a central office by the diligence of clerks, such are the materials upon which, to a great extent, the engineer decides on lines and sections, designs working plans, and provides for such incidents as arise in the course of operations. This method is not favorable to the consummate performance of a task, subject to an infinite variety of conditions, and calling, from its outset to its close, for the immediate action of the best judgment available. No report, however able, can supply all that is required for a thorough mastery of critical points. The experienced eye on most occasions sees more than the pen can describe, and elicits, by inquiry and inspection, much that would never strike the mind from the perusal of a statement in writing. It is further to be remarked that, whereas this system does not apply to the chief only, but descends through all ranks to the lowest department, it must often happen that the details on which the chief ultimately acts, really originate with subordinates of very modest qualifications, from whom they pass through various ascending stages, with little effectual modifications, though with various marks of control, until at length they reach the engineer-in-chief. This method presents a show of organization which English offices do not exhibit; on paper it is highly methodical and imposing. Copious details are amassed, and every transaction has its special document; all is minutely recorded and easily referred to; whatever, in short, can be arranged and classified in writing is so arranged and classified in great perfection. But this system is not an efficient substitute for the less formal but more direct process by which the engineer is thrown into constant personal relation with the realities with which he has to deal, doing nothing of importance at second or third hand, but directly grappling with all that is material to the success of his undertaking.—*Pioneer.*

Slip of the Locomotive Driving-Wheels.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The *Moniteur Industriel Belge* publishes an interesting discussion, held at a meeting of the Civil Engineers' Society, of Paris, regarding the slip of locomotive driving-wheels.

This question was laid before the Academy of Sciences, and in answer M. Desmousseaux de Givre addressed a letter, which was discussed by the meeting. He demonstrates the exact positions in which the slip, or the tendency to slip, is maximum; he gives a schedule of experiments that will practically confirm his theory; he proposes a new design of locomotive to overcome the evil. His locomotive has two double-piston cylinders, placed between two axles; each piston is connected respectively to the front or rear axle, the axles being coupled. In this way his locomotive has perfectly steady motion, the momentum of reciprocating parts and the reaction of steam being perfectly neutralized. In the discussion of the above it was said: "If this solution is not accepted, it will be necessary to find another; because—this is the point to which we attach special importance—the common locomotive, with two cylinders and two cranks at right angles, is *actually unsuited for high speed service* (90 to 120 kilometers)." It was said that the slip of locomotive driving-wheels amounts to 20 per cent.; that is, the locomotive would make 120 miles instead of 100 if there was no *slip*. On the Uetliberg railroad, with a grade of 7 in 100, experiments have been made with the ordinary locomotive, and the slip of driving-wheels was found so considerable that the gear system (a cremaillere) was found to be more economical.

Persons who are in position to make experiments to determine the slip of locomotive driving-wheels would do a great service by making them with different kinds of locomotives, at different speeds, and on different grades and curves. Such experiments do not present great difficulties—a good recorder, giving the exact number of revolutions can easily be attached to a driving-wheel axle, and the distance run by the locomotive can be exactly determined.

With the reports of such experiments it is necessary to note the state of the weather, sizes of the cylinders, the steam pressure, the weight on each driving-wheel, the weights of reciprocating parts, and an accurate sketch of the driving-wheels with their counter-balance weights, also a sketch of the main-connecting rod, should be given. With the above data we can easily calculate the slip of any locomotive under any circumstances.

In my article (published in this paper, June 5, 1875), on the Wells balance engine as applied to the locomotive, I also proposed a double piston engine to prevent slipping, and other evils. If the 20 per cent. of economy in steam is to be obtained it is already in itself a handsome saving for a railroad company, but is the wear and tear of the tires, rails, rail-joints, frogs, and of the locomotive itself, of small account? This increased wear and tear is due partly to the lateral motion, and partly to the centrifugal force of the counter-balance weights, which, in certain positions, diminishes the adhesion and causes slip of driving-wheels; while in other positions it increases it and gives unnecessary pressure on the superstructure of the road. This increased pressure should always be taken into account when calculating the strength of bridges—a factor which, I believe, is generally overlooked. A speed can be reached when this centrifugal force is nearly equal to the load on the driving-wheels.

Regarding the double-piston engine, I would say that such a system as proposed by M. Desmousseaux de Givre, in Paris, is not practicable—at least not on American express locomotives, where the two driving-wheels and axles are separated by the fire-box. An engine of the Wells system, as described in my article above referred to, is both: practical, and can be easily applied to old locomotives. It is best to place the cylinders outside. The peculiar shape of a crank that would have to be adopted is not an objection, and those who believe it to be so I invite to make a design, and study the action of forces that are acting on it; and I am always ready to give my own design with an exact calculation of the forces acting, and of the strength of this crank. THOS. F. KRAJEWSKI, M. E.

No. 73 BROADWAY, NEW YORK, Dec. 10, 1877.

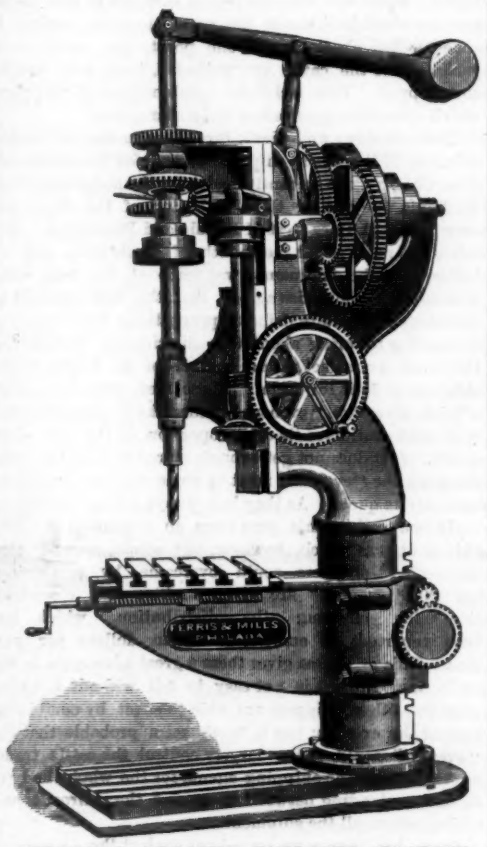
Ferris & Miles' 51-inch Swing Upright Drill.

The machine here figured is described substantially as follows by the manufacturers:

This machine is capable of drilling holes up to 2½ in. diameter in solid iron, or of boring up to 24 in. diameter, and can reach to the centre of 51-inch wheels. It is driven by bevels, geared 2 to 1 from large cones with 4 steps for 3½ in. belt and powerfully back-geared.

The steel spindle of 3 in. diameter is counterbalanced by a weighed lever attached directly to its upper end. This saves the drills from breaking when drilling through blow holes or spongy places. The lower end of the spindle, which holds the drills and chucks, never projects below its bearings in the old way; but, by an improved arrangement, is held and rigidly guided into journals upon a long slide gibbed to the frame of the machine. This slide, and with it the spindle and drill, can be thrown rapidly up or down at will, through a traverse of 26 in., or by our patent annular clutch be instantly changed to slow motion or self-feed, or vice versa.

The feed gear has three changes of fine feed for drilling. It is also fitted with back gear, which gives three coarse feeds for



IMPROVED UPRIGHT DRILLING MACHINE,

By Messrs. Ferris & Mives, Philadelphia.

boring, six changes in all. The massive table, which raises and lowers upon the column in the usual manner, has also a traverse motion on its bracket by screw for convenient adjustment. It also swings round the column out of the way when required. The base plate can then be used for placing work to be drilled or bored, for which purpose it has a hole prepared to receive bushings for boring bars.

It was designed and is manufactured by Messrs. Ferris & Miles, of Philadelphia.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Brockville & Ottawa.—Mr. John G. Richardson has been chosen President, and H. Abbott, Managing Director.

Cairo & St. Louis.—The United States Circuit Court at Springfield, Ill., has appointed Henry W. Smithers, of New York, Receiver. The Receiver has appointed L. M. Johnson General Superintendent of the road. Mr. Johnson is now Chief Engineer and Paymaster of the Keokuk & Des Moines.

Central, of New Jersey.—Mr. William H. Agnew has been appointed Assistant Superintendent. He was formerly connected with the Morris & Essex road.

Chicago & Northwestern.—Mr. J. O. Chapman has been appointed Master Mechanic of the Iowa Division, in place of C. C. Elliott, resigned.

Chippewa Falls & Western.—The following officers have been elected for the ensuing year: President, Horace Thompson, St. Paul, Minn.; Vice-President, Wm. P. Bartlett, Eau Claire, Wis.; General Manager, L. C. Stanley, Chippewa Falls, Wis.

Denver & South Park.—The directors of this new company are: Wm. Barth, Walter S. Cheeseman, Alvin B. Daniels, J. Sidney Brown, John Evans, Charles B. Kountze, D. H. Moffat, Jr., John Smith, Geo. Tritch.

Detroit, Eel River & Illinois.—The bondholders, who bought this road at foreclosure sale, have organized a new company with the following directors: Christian H. Buhl, Theodore D. Buhl, W. W. Crapo, James F. Joy, D. L. Quirk, Allan Sheldon, Elijah Smith.

Greenville, Columbus & Birmingham.—The officers of the *Greenville Construction Company*, which is building this road, are: President, C. P. Huntington; Secretary and Treasurer, Henry T. Irish. The office is at Greenville, Mississippi.

Hannibal & St. Joseph.—The following appointments and changes are announced: E. B. Easton to be Auditor, in place of W. Wilms; Col. Easley to be General Attorney, in place of James Carr; W. R. Woodward, Superintendent Eastern Division, in place of P. H. Drew; Isaac N. Eaton, Land Commissioner, in place of R. Deane; Frank Butler, Traveling Auditor, in place of J. E. Totten; the office of Assistant General Superintendent is discontinued.

House Committees.—Hon. Clarkson B. Potter having declined to serve as Chairman of the Committee on Pacific Railroads, Mr. Throckmorton, of Texas, becomes Chairman. Hon. Abram S. Hewitt, of New York, is appointed to fill the vacancy in the committee. Mr. Potter asked to be excused from serving for the reason that he has large railroad interests, which might be thought to influence his official action.

Little Rock & Fort Smith.—Mr. P. J. Bennett has been appointed General Passenger and Ticket Agent.

Montour Branch.—The first board of directors is as follows: Wm. McCreery, Geo. A. Berry, W. B. Rodgers, John A. Caughey, John Bissell, W. M. Short. The road is to be a branch of the Pittsburgh & Lake Erie.

New Haven & Derby.—The new board has elected J. H. Bartholemew President; Isaac R. Anderson, Vice-President; F. E. Harrison, Secretary; Charles Atwater, Treasurer; E. S. Quintard, Superintendent. Mr. Anderson succeeds C. L. English; the others are re-elected.

North Pennsylvania.—Mr. W. C. Moore has been appointed Auditor of Passenger and Freight Receipts. After Jan 1, 1878, all communications pertaining to his department, including ticket, freight and car service reports, should be inclosed to him at No. 407 Walnut street, Philadelphia.

Providence & Springfield.—The new board has elected Wm. Tinkham President; Jabez C. Knight, Clerk; Wm. A. Lute, Treasurer.

Quincy, Missouri & Pacific.—Mr. Frank D. Schermerhorn has been appointed General Superintendent, in place of J. R. Buchanan, resigned.

St. Louis, Keokuk & Northwestern.—At the annual meeting in Keokuk, Ia., Dec. 4, the following directors were chosen: H. B. Blood, A. L. Griffin, Keokuk, Ia.; John O. Roberts, Clarksville, Mo.; George Edmunds, Carthage, Ill.; Amasa Stone, W. H. Harris, Cleveland, O.; A. B. Stone, New York. The board elected A. B. Stone, President; A. L. Griffin, Vice-President; H. B. Blood, Secretary and Treasurer; George Edmunds, Attorney.

Senate Committees.—The following are the standing committees of the United States Senate which have relation to railroad matters. *Railroads.*—Senators Mitchell, of Oregon, Chairman; Dawes, of Massachusett-; Dorsey, of Arkansas; Teller, of Colorado; Saunders, of Nebraska; Windom, of Minnesota; Matthews, of Ohio; Ransom, of North Carolina; Barnum, of Connecticut; Lamar, of Mississippi; Armstrong, of Missouri. *Post Offices and Post Roads.*—Senators Ferry, of Michigan, Chairman; Hamlin, of Maine; Paddock, of Nebraska; Conover, of Florida; Kirkwood, of Iowa; Burnside, of Rhode Island; Saulsbury, of Delaware; Maxey, of Texas; Bailey, of Tennessee. *Transportation Routes to the Seaboard.*—Senators Cameron, of Wisconsin, Chairman; Windom, of Minnesota; Conover, of Florida; Cameron, of Pennsylvania; Davis, of West Virginia; Harris, of Tennessee; Lamar, of Mississippi; Beck, of Kentucky; Butler, of South Carolina.

Senator Barnum is now President of the Housatonic, and was formerly President of the Connecticut Western. Senator Dorsey was at one time President of the Arkansas Central, Senator Cameron, of Pennsylvania, is a director in several companies.

Southern & Atlantic Telegraph.—At the annual meeting in New York, Dec. 6, the following directors were chosen: William Orton, Charles W. Blossom, Henry Hentz, Charles M. Fry, A. B. Grant, John W. Kirk, Wm. H. Abel, R. H. Rochester, Norvin Green.

South Pacific Coast.—The officers and directors are as follows: President, A. E. Davis; Secretary, B. B. Miner; Superintendent, W. Carter; Directors, A. E. Davis, E. Barson, Seth Cook, G. W. Kidd, Cary Peebles, J. Barr Robertson, Joseph Clark.

Syracuse, Binghamton & New York.—At the annual meeting recently the following directors were chosen: Samuel Sloan, Moses Taylor, William E. Dodge, Percy R. Pyne, George Buckley, George Bliss, U. A. Murdock, John Brisbin, T. B. Fitch, E. F. Holden, Fred. H. Gibbens, Fred. F. Chambers, Benjamin G. Clark. The road is controlled by the Delaware, Lackawanna & Western.

Washington & Ohio.—At the annual meeting in Alexandria, Va., Nov. 28, Mr. Lewis McKenzie was re-elected President, with the following directors: Cassius F. Lee, Fairfax County, Va.; Wm. Byrd, Frederick County, Va.; Richard Henry Lee, Benjamin Morgan, Clarke County, Va.; Charles B. Ball, Henry T. Harrison, Henry Heaton, Loudoun County, Va. The only new director is Mr. Byrd, who succeeds Col. F. W. M. Holliday, recently elected Governor of Virginia.

Wilmington & Weldon.—At the annual meeting in Wilmington, N. C., Nov. 20, R. R. Bridgers was chosen President, with the following directors: Curtis H. Brogden, J. D. Cameron, A. J. DeRosset, George H. Harris, George Howard, B. F. Newcomer, S. M. Shoemaker, W. T. Walters, W. H. Willard, W. A. Wright.

PERSONAL.

—The late Gardner Chilson, of Boston, the well-known manufacturer of car-heaters, left an estate valued at between $400,000 and $500,000. By his will $150,000 are left in trust for the use of his son and $85,000 to several missionaries and other societies connected with the Baptist Church. The Baptist Home Missionary Society and the Baptist Missionary Union are to receive all of the estate remaining after the payment of these legacies, and are also to receive the money left in trust for his son after his death.

—Mr. C. C. Elliott, for ten years past Master Mechanic of the Iowa Division of the Chicago and Northwestern, has resigned his position.

—Mr. Philip P. Pendleton, President of the Valley Railroad Company of Virginia, and formerly a Baltimore city director in the Baltimore & Ohio, died at his residence in Baltimore, Dec. 10. Mr. Pendleton was born in Winchester, Va., in 1816, and came to Baltimore when 16 years old. For a time he was in the dry-goods business, but for 25 years past he has been in the grain trade. He was at one time President of the Baltimore City Council.

—Mr. D. Jones Lucas, late Resident Engineer for the Empire Transportation Company, having been retired by the transfer of that company's business, has established himself in Foxburg, Pa., where he intends to practice as a civil engineer.

Injury to Person not a Passenger.

In Hicks against the Pacific Railroad Company, plaintiff brought suit to recover damages for injuries received by him while standing on the platform at a depot. He was struck by a projecting stick of timber on a car of a passing freight train. The Missouri Supreme Court held:

The company was liable for the injury. One who is not a passenger, nor at the depot intending to take passage, does not occupy the same relation to the company that a passenger does; nevertheless he is not a trespasser, and if injured by the negligence of the company's servants, without negligence on his part directly contributing to the injury, may recover damages.

RAILROAD GAZETTE

Published Every Friday.
CONDUCTED BY
S. WRIGHT DUNNING AND M. N. FORNEY.

CONTENTS:

Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

RAILROAD APPORTIONMENT SCHEMES.

II.

Last week we gave some account of the plan and working of the oldest of the existing schemes for the division of traffic, the "Omaha pool"—a simple plan, regarding a simple but important business, which has worked satisfactorily for the past seven years, with no other machinery than the co-operation of the three companies which are parties to the agreement.

Next in point of time are two agreements for dividing by peculiar methods two of the most important traffic staples in the United States—the live stock from the West to the East, and the petroleum traffic from the wells in Northwest Pennsylvania first to the refining centres, and then to the sea-board cities. There is no connection between these two kinds of traffic of course, but the methods of dividing them are substantially the same.

THE LIVE STOCK APPORTIONMENT.

Our information concerning the agreements for the division of live stock shipments (for there is more than one) does not extend to the details. That is, we are not able to say what proportion of the business each party to the agreement gets; but it is sufficiently explicit as to the means by which the division is effected. This traffic is in one respect different from most of that for which the railroads compete. It is not to any considerable extent subject to the competition of markets. A considerable number of hogs are brought to Eastern cities to be packed, and there may be some competition for these; but nearly all the cattle and most of the other animals are to supply fresh meat for the daily consumption of the great cities. Each place receives what it will consume, no more and no less, and there is never any danger that Baltimore or Montreal will divert cattle shipments from New York or Philadelphia. This fact has limited the number of competitors for the traffic of any one city, but it can hardly be said to have decreased the competition for it. At the eastern ends of the routes three roads competed for the supply of New York, two for that of Baltimore, and now two or three are able compete for that of Philadelphia. The number of competitors in the West is greater—four at least out of St. Louis and three or four out of Chicago.

The live-stock traffic is a peculiar one. The cattle suffer if they are long on the road, and therefore live-stock trains are timed to run faster than ordinary freight trains, and have privileges which enable them to avoid delays, often at the expense of other trains. The cattle must be unloaded for food, water and rest at intervals not more than 28 hours apart, and yards with special provisions for this purpose must be established at the transfer stations. It is thus a somewhat costly freight to carry. And the cars in which the cattle are carried cannot be used for carrying ordinary merchandise on the return trip. In the West, beyond Chicago and St. Louis, the return stock cars can be utilized for carrying lumber; but there is little freight to be had in Eastern cities which can be put into stock cars. Coal is sometimes carried in them from Waverly to Buffalo over the Erie, and the Pittsburgh, Fort Wayne & Chicago has taken a good deal of coal and coke from Pittsburgh to Chicago; but generally stock cars cannot be utilized to nearly the same extent as grain cars on the return trip. There is thus good reason why much more than the average freight rates should be collected from this traffic.

Whenever agreed rates are maintained, this is usually done, a car-load of cattle from Chicago to New York bringing $100 or $110 or even $120 when a car-load of grain brings from $60 to $80, and a car-load of provisions from $70 to $90. But there has been more "cutting of rates" for live stock, perhaps, than for any other east-bound traffic. There are some very large shippers of live stock, and the whole business at the great shipping centres is concentrated absolutely at one point—the union stock yards, where the cattle are unloaded, kept, sold, bought and shipped. This facilitates combinations of shippers, which often have great effect in breaking rates.

There are now, we believe, three agreements for the distribution of live stock shipments; one for the shipments from Chicago, one (recently made) for the shipments from St. Louis, and one for the distribution of the shipments over the trunk lines west of Buffalo and Pittsburgh. The latter was made about the month of April, 1875, and we believe that the first named was made at the same time. The railroad companies agreed that the traffic should be distributed in certain definite proportions, but instead of attempting to bring about this distribution themselves, they made a contract with a number of the largest cattle-shippers to do it for them. These men, who are generally known as the "eveners," undertake to guarantee that each road shall have its due proportion of the total shipments. If it does not get enough offered to it by the other shippers, the "eveners" must in some way get enough to make up its quota. As they had always a large number of their own to ship, this gave them an advantage in filling this contract, which, however, one would suppose that the other shippers could overcome by combining; but the "eveners" are given a rebate as a consideration for effecting the distribution, which has been reported to amount to fifteen dollars per car-load. This of course gives them a great advantage in the trade; how great it is not easy to tell without knowing what the other shippers are able to effect by combining against the eveners; but it would seem probable that the "eveners" would either largely control the cattle trade, or else become the shipping agents for the whole body of shippers, standing between them and the railroads, and taking toll on all the shipments.

There has been some complaint against the advantages of the "eveners," but not nearly so much as might naturally have been expected, which leads to the supposition that they have not been able to command their rebate without some efforts and expenditures which have lessened the advantage of it. On its face it appears like an insufferable discrimination, given in return for a service which only a select few are permitted to render, and which does not necessarily cost nearly as much as is allowed for it. If it does so work, and tends to give the "eveners" a monopoly of the traffic, we do not believe that it can be maintained. It is probably true, however, that this traffic could not be divided by any ordinary agreement, because of the facilities for combination among shippers; and it is doubtless true that it is much better for the railroads to pay a high price for the distribution of the live stock rather than compete for it as they used to do. We feel sure, however, that they will not permanently be permitted to effect any advantage for themselves, however great and however legitimate in itself, by means which discriminate in favor of some and against others of their customers engaged in the same branch of business.

The live stock agreement has worked successfully and is still in operation. The railroad companies apparently are satisfied with it, and the "eveners" find it practicable and profitable to carry it out. It continued throughout the year 1876, when nearly all other through traffic except petroleum was carried for less than cost on the trunk lines. Rates have been changed several times under it, and they have sometimes been lower than any of the parties desired, owing to the competition of some outside line for part of the traffic, or other cause. Generally the rates have been quite moderate under it, compared with regular agreed rates previously and the cost of the business.

THE PETROLEUM APPORTIONMENT.

The petroleum traffic is comparatively a simple one, as the wells are less than 500 miles from the chief exporting cities, and much nearer to the great Western refining centres at Cleveland and Pittsburgh. It is, however, competed for by the four trunk lines, the Baltimore & Ohio bidding for it at Pittsburgh, and the other trunk lines having railroad connections with the oil regions. A great deal of oil is refined at the ports where the chief exports are made, and the destination of the oil when it leaves the well may be to Pittsburgh or Cleveland or to an Eastern port to be refined; and the oil refined at the Western cities may be destined for local and Western distribution, or for shipment to New York, Philadelphia or Baltimore, for export or local distribution in the East; while the oil refined at Eastern ports is likely to be distributed locally or exported—not shipped to the West. A small transportation rate adds a large percentage to the cost of the oil, which when refined is often not worth more than two cents per pound. The current low fourth-class rate from New York to Chicago is equal to an addition of about 25 per cent. to this price. Thus the refineries near the oil wells are able to compete for the supply of the world, while those four or five hundred miles further east can (except for special brands) compete only for the supply of the country east of them and of that in their vicinity.

Petroleum is collected from the wells by "pipe lines," which are, we may say, the application of hydraulic engineering to the business of transportation, the oil being carried in pipes as water is in cities, not wholly by gravity but also by the help of pumps. These pipe lines deliver the oil to tanks at certain railroad shipping stations. The proprietor of the well receives a receipt from the pipe line for the oil which he delivers something like the grain receipts given by elevators in the Northwest, which entitle the holder not to the identical material for which the receipt was given, but to an equal quantity of material of the same grade. But in the case of the oil receipts, we believe, the holder can demand his oil anywhere, on paying the regular transportation charge to that place. Thus the transportation by rail may be made without orders from the owners, if the carrier knows that there is a steady demand for oil at the places to which he sends it. The carrier is interested in having a sufficient stock of oil to satisfy any receipts that may be presented at every place where such receipts are likely to be presented. Thus the pipe line can to a great extent dictate the rail route by which shall be shipped the oil which it collects. There are now about 2,000 miles of pipe lines in the oil regions, more than 500 of which were recently owned by a single transportation company. But aside from the control given by the ownership of pipe lines, there have been in the petroleum trade great organizations controlling enormous quantities of oil, and there is now in that trade one corporation which ships hundreds of car-loads daily. Here a combination of shippers was not necessary to turn the bulk of traffic from one line to another to affect rates: the great company could do this with its own traffic. It is several years since the Standard Oil Company became the greatest power in the petroleum traffic, being known chiefly as a refiner, with enormous works in Cleveland. It has grown almost uninterruptedly since, and now has great refineries in New York, Philadelphia, Baltimore and Pittsburgh, as well as Cleveland, and owns more than half the pipe lines in the oil regions. It is the chief consumer of crude oil, and so commands the chief shipments from the wells; and it is the chief seller of refined, and so commands also the shipments of that. Evidently no agreement for the division of traffic would be effective without its consent. It thus naturally wields a tremendous influence with the railroads which carry petroleum. The traffic is a very large one, the exports alone for the current year averaging more than 30,000,000 gallons monthly, or the equivalent of about 10,000 ordinary freight car-loads. It has generally been considered a profitable business, too, when the agreed rates were maintained, though careful estimates by at least one of those engaged in its transportation indicate that the margin of profit was really very small, even after the rates were raised last October. But the belief in its profitableness has been general enough to make all the trunk lines eager to get the traffic. And perhaps they have been in some degree moved by the fear that the Standard Oil Company, if not granted acceptable terms, might not only refuse to distribute the traffic as the roads desire, but might put itself in condition to do without their services entirely, and do away with this railroad traffic of hundreds of car-loads daily from the wells to the refineries and the sea-board. The great extent and effectiveness of the pipe lines some time ago suggested that what had proved so economical for the carriage of comparatively small quantities for short distances might be made equally economical for the carriage of large quantities over great distances—for the full supply of the Pittsburgh and Cleveland refineries and the demand at the Eastern ports. Such an undertaking would be a comparatively small matter for the Standard Oil Company, and with such a pipe line its advantage over other refiners and its control of the petroleum traffic would be more complete than ever. It would be its own carrier, and all other producers would have to contribute to its support, unless, as is not prob-

able, they had business enough to support another pipe line at equally low cost.

The agreement for the distribution of the petroleum traffic was made shortly after that for dividing the live-stock traffic, about May, 1875, and it was substantially similar to that agreement. The railroads agreed that the shipments of crude from the wells, and of refined eastward from the Western refineries, should be distributed among the carriers in certain definite proportions, and the Standard Oil Company, in consideration of an allowance made to it on the shipments to the refineries (not on those of refined to the East), contracted to bring about the division. This it is able to do with its own oil, in the face of any possible combination of other shippers to send by one line to the exclusion of the others.

We are not able to say just how the oil business was divided under this agreement. Besides the four trunk lines, it was necessary to include the roads in the oil regions in it, and those which carry crude oil to the Cleveland and Pittsburgh refineries. The agreement was maintained substantially just about two years, but last May it was interrupted by a difference between the Empire Transportation Company, which conducted nearly all the oil traffic over the Pennsylvania Railroad and owned more than 500 miles of pipe lines, and the Standard Oil Company. The Empire Company, claiming that it could not otherwise protect itself as an oil carrier, determined to become an oil refiner, and took steps to establish great refineries in Philadelphia and refused to give better rates to the Standard Company than to other oil shippers. The Standard Oil Company thereupon declined to give any of its business to a competitor in the refining business, made all its shipments by the other roads, and the rates which had been maintained for two years were greatly reduced, and the business for five months, while it was much larger than ever before, was rendered nearly or quite unprofitable. During this contest, which was nominally between the Empire Transportion Company and the Standard Oil Company, it seems that the Empire Company substantially did all the carrying for the refiners outside of the Standard Campany, who thus made common cause with the Empire Company. The result of the contest apparently satisfied the Pennsylvania Railroad Company that, under the circumstances, it could not afford to have the Standard Oil Company as a permanent enemy. The railroad company, however, did not suffer to anything like the extent that we once supposed and have heretofore intimated, judging from the Philadelphia business alone. There was a large decrease in the Philadelphia receipts during the conflict, and most of the oil arriving there then came, not as before by the Empire Transportation Company over the Pennsylvania Railroad, but by the Erie, Lehigh Valley and Reading roads, which formerly carried no oil to that port. *At Philadelphia* the oil traffic of the Empire Company was really substantially destroyed, the small consumption of the independent refineries there and the shipments of a certain number at Pittsburgh afforded the Pennsylvania Railroad but a small traffic to that port. The Philadelphia refineries were chiefly controlled by the Standard Oil Company, and the Empire's traffic came wholly from outside parties. There was, however, a considerable "outside" interest at Baltimore and a much larger one at New York, whose traffic the Empire Company carried during the contest. And this traffic was so considerable that the Empire Line's total business during the contest (May 14 to Oct. 17) was substantially the same as for the corresponding period the previous year, and a very large proportion of the whole oil business. This, however, did not keep up the transportation company's old *proportion* of the total business, which has been about 50 per cent. greater this year than last. It was natural, of course, that the Pennsylvania Railroad Company should be dissatisfied not to receive any part of this vast increase in traffic; and though the completion of the Empire Company's great refinery at Philadelphia might have enabled it to secure more business, it probably was not easy to see how the business, large or small, could be made profitable, so long as the Standard Company should be hostile, and be supported by other transportation companies. At least, the Pennsylvania Railroad Company determined to exercise its right under its contract with the Empire Line to purchase the latter company's stock and business, and to unite with the other trunk lines in a new contract with the Standard Oil Company for an apportionment of the entire petroleum traffic by the same method as before, but, we understand, in somewhat different proportions. We understand, too, that by this agreement the shipments are made in definite proportions to the three ports of New York, Philadelphia and Baltimore, as well as by the different routes; and it is reported that 63 per cent. of the whole is to go to New York, one-third of it by each of the trunk lines having termini there.

As we remarked in the beginning, it is not easy to deal in the ordinary manner with a shipper who controls the larger part of one of the leading traffic staples, especially when that shipper has it in his power to supply himself with a transportation line of his own. But there is an obvious and grave objection to any contract which gives one shipper, however powerful he may be, or however useful he may make himself to the carrier, an advantage over his competitors in business—an advantage which they can in no way secure. The whole tendency of such a discrimination is to create a monopoly in that particular trade. The Standard Company, which has succeeded to the pipe lines and refineries of the Empire Transportation Company, is now stronger than ever before, and perhaps would be able to control the petroleum business pretty thoroughly, without any advantage in transportation rates. But, as we have intimated before, it perhaps could secure its advantage in transportation without the help and even in the face of the opposition of the railroad companies, by constructing a pipe line for its own use, which might suddenly put an end to this immense railroad traffic on all the trunk lines. Indeed, there is reason to suspect that in course of time the railroads will lose this traffic, and perhaps at so early a day that the policy of the present agreement may never be seriously questioned. Certainly, if there is any great advantage in a through pipe line, they will have to be satisfied with very moderate profits from petroleum business even in advance of the construction of such a line, and thus will not suffer greatly by its loss. There is, however, an enormous stock of tank cars provided for the petroleum traffic, which cannot be used for any other business, and on this account the sudden diversion of the petroleum traffic from the railroads to a pipe line or lines would at once cause a heavy loss.

The Annual Reports of the Master Mechanics' and Master Car-Builders' Associations.

Brief reference was made to these two reports a few weeks ago. As the greater portion of the proceedings of the conventions of these two associations has already been published in these pages, it is not necessary to summarize in any way the contents of the two volumes before us. The one is the tenth and the other the eleventh annual report, and we believe that those who have not a complete set of them have little idea of the amount of material they contain.

Nevertheless, in looking them over, it is quite natural to compare, in imagination at least, those reports as they are, and as they might be. They are now a record of the experience and observation of those engaged in the management of the rolling stock of our railroads and indicate the subjects which have occupied the attention of the members of those associations and the range of their researches and deductions. It is interesting to note these. It should be observed first, however, that the subjects reported upon are not so sure an index of the thoughts which are uppermost in the minds of the members as the discussions which followed.

The first report of committees in the proceedings of the Master Mechanics' Association is one on "Locomotive Frames and Bracing." Now it would be supposed that, owing to the importance of this part of locomotive construction and the expense which is often involved in the breaking of locomotive frames, this subject would be of very great interest to those who are obliged to superintend the repairs when locomotives fail from this cause. Instead of this being the case, however, the report was passed over without a word of discussion. It may be observed, that whenever any subject which comes under the immediate and daily observation of the members of the Association it always excited interest; but when topics of much greater importance, but about which the members were not in the habit of thinking, were brought forward, there was seldom anything said about them. Thus in the Master Mechanics' Association for years the mileage of locomotive tires was an annual subject for report and discussion; the lap, lead and travel of slide valves has until this year always excited debate, the long-travel men and the short-travel men ranging themselves on opposite sides. At the last convention the discussion languished for awhile on the subject of long ports and short ports. A good deal was said about lubrication. At the Master Car-Builders' conventions the most economical speed for running trains, steel versus iron axles, diameter of car wheels, iron cars, mileage of car wheels, repairs of freight cars, coupling cars, dead weight of cars, etc., were the topics most talked about. Now this fact may be observed in all their discussions and reports, that whenever they relate to those matters which the members of the association referred to are in the habit of doing, their remarks nearly always contain some useful information and some valuable facts; but nearly always when they undertake to discuss a theory involving many facts and data, they are apt to wander about very aimlessly. Thus in a discussion at the Master Car Builders' Convention the statement was made that the amount of gross weight to paying weight carried on railroads was in the proportion of 2½ to 1. The statement was simply discredited, because those who refused to believe it had never investigated the subject at all. It is one of those facts which lay hidden a little under the surface; but a very small amount of time devoted to collecting and compiling a few figures would convince anyone of the correctness of that statement, who desires to know what are the real facts about it. An attempt was made at the last meeting of the Master Mechanics' Association in Philadelphia, to show that a very great economy resulted from the hauling of long and heavy trains instead of short and light ones. Although there was a very respectable array of figures to demonstrate that proposition, the report and the subsequent discussion fell upon deaf ears. Its truth has been abundantly demonstrated on a number of roads since. That it costs very little to carry dead weight is a truth which is always received with great incredulity at those meetings. A sixteenth of an inch more or less inside lap on the slide valve of a locomotive will stimulate master mechanics to an excited state of animation at almost any time, but the proportion which the size of a locomotive boiler should bear to the weight on the driving-wheels, and the best plan of construction so as to make it possible to get the greatest amount of boiler capacity will hardly attract a ripple of attention in a whole room-full of such officials.

Now it is not our purpose to attempt to under-estimate the great practical ability of these men. A railroad manager remarked to the writer recently that the more he became occupied and absorbed in having things done the less was he inclined to theorize and write about them.

The measure of the master mechanics' ability is their capacity to have things done; that is, give them a number of locomotives and a road to run them on, and their ability would then be measured by the amount of work they would succeed in having their locomotives do, at the least cost, although possibly they could not write a lucid or at all a comprehensible account of how it was done. But, making full allowance for the fact of their ability and usefulness in this way, yet it seems certain that the usefulness of these men and their value to their employers would be very much greater if, besides the practical ability, they devoted more time to what they now seem to regard as purely theoretrcal research. There are questions which have great practical importance, the solution of which many engineers have been waiting years to learn. Thus the whole subject of the resistance of railroad cars in curves and on straight lines is still in an almost impenetrable mist. In vain will engineering literature be searched to find out what effect the coning of wheels has on their resistance. None of us know certainly what the practical effect is of increasing the diameter of wheels, or of the length of the wheel-base. Loose wheels are again being brought prominently to the notice of railroad men, and yet any one who tries to learn what the effect of their use is will find it difficult to refer to experiments that are in any way demonstrative.

The solution of a great many subjects connected with railroads can only be worked out by carefully collecting statistics and reasoning from them. These in most cases are inaccessible, or have not been kept with sufficient care to have much value. The cost of lubrication, the cost of repairs of different parts of cars and engines, the deterioration and life of cars, and a hundred other questions, might be asked, to which it is impossible to give a correct answer. Now if the members of the associations named were in the habit each year of making either experimental investigations and researches and reporting them, or of collecting statistics relating to the working of their departments and submitting the results annually, there might be an amount of knowledge accumulated in these reports which would year by year become a perfect mine of useful information. At the present time foreign engineers have been experimenting on the slip of locomotive wheels, and some surprising results have been reported. Among others the statement is made that the amount of slip in running down a grade is very much greater than in ascending, which seems almost paradoxical. It also seems probable that a great deal more power is expended in slipping the wheels especially at high speeds, than has heretofore been supposed. Now hardly any experiment would be easier to make than to determine the amount of slip: all that would be needed would be a revolution-counter, an exact measure of the length of the road and of the diameter or circumference of the wheels. Anyone, even an apprentice, could make such an experiment and then calculate the results. Such simple experiments as these, if placed on record, are valuable, and if different members would take one or more questions or subjects of an analogous kind and investigate them thoroughly and make a clear report of them, it would make the annual reports of much greater value than they now are, and we believe members would be surprised at the amount of this kind of knowledge which would thus accumulate year by year.

What is needed to increase the value of the reports is more original research and experiment. Each member can devote some little time to this, and investigate some simple subject at least; and even if he did no more than to weigh the castings on a locomotive, and report their weight, or give in detail the quantity of forged work in a car truck, it would have value if placed within the reach of members.

The Fall Grain Movement.

It has been intimated that farmers and dealers have been unduly negligent this fall in supplying the European demand for grain, and have permitted the market to be stocked from Russia (through Baltic ports) and Hungary to an undue extent, by maintaining artificial prices and otherwise. It is possible, of course, that more American grain might have been sold if it had been offered cheaper; but if the conclusion is drawn that the country has had but a small grain business since last harvest, it will be a great error. The figures for the receipts and shipments of the chief Northwestern markets and the receipts of Atlantic ports for the period from Aug. 4 to Dec. 1 have been for five years, in bushels:

	1877.	1876.	1875.	1874.	1873.
Northwestern receipts	88,818,172	63,494,207	70,988,950	67,371,676	78,145,513
Northwestern shipments	72,912,568	64,108,988	61,185,651	45,891,433	63,513,234
Atlantic receipts	87,123,161	60,642,726	64,124,002	54,132,205	57,360,959

If this year's business was bad, then the country never had a good grain business. That of 1873 was much heavier than for any preceding year, but this year's movement exceeds the largest of all previous years by 21½ per cent. in Northwestern receipts, by 13¾ per cent. in Northwestern shipments, and by 36 per cent. in Atlantic receipts. That is, the business has been much the largest ever known. The grain has gone forward from the Northwest nearly as fast as it was received, and there is now no unusual stock accumulated either at Western or Eastern markets: that is, the stock has been taken for consumption about as fast as it was brought forward. It is true that the increase in shipments from Baltic ports has been greater than from this country; but the Russians have been in a manner forced to hurry their grain to market before the end of November, because that sea is closed in winter, and the Black Sea, which is the chief outlet for Russian grain to England in ordinary times is blockaded, so that South Russia as well as North Russia must export either by the German railroads or the Baltic. Probably no possible reduction of rates would have prevented the Russians from sending forth their grain as fast as their limited facilities would permit. They can now export only by rail, and will not be likely to enter the British market to any great extent until the spring.

The Logic of Events.

Probably some of the readers of the *Railroad Gazette* have not noticed a very significant item which appeared in the number of last week in relation to the Toronto, Grey & Bruce Railway, which is a 3 ft. 6 in. gauge line, built from Toronto, Canada, and extended in a northwesterly direction from that place to Owen Sound. The company owns 195 miles of road including a branch 73 miles long. It is now proposed to raise $900,000 *to change the gauge.* This road was built only five or six years ago with a tremendous sound of trumpets in commendation of the narrow-gauge system. Now, to quote from a letter from an officer of that line: "As soon as the money can be raised the *gauge will be changed to 4 ft. 8½ in.;* this will give an idea of the result of the experiments of a 3 ft. 6 in. gauge to compete with the 4 ft. 8½ in. in fewer words than I could explain on a dozen sheets of paper."

This action of the Canadian company coming so soon after the memorial of the Bombay Chamber of Commerce petitioning the Secretary of State for India that the gauge of an important road projected in that country should be changed from a metre (39⅜ in.) to 5 ft. 6 in., must, it would seem, be a severe blow to the new "system."

The great wonder hereafter must be how this narrow-gauge delusion, which has spread over the whole world, could have been credited, in some cases even by intelligent engineers. As has been pointed out a great many times in these pages, the primary and fundamental error is the assumption that if the rails are placed near together the cars and engines will then weigh and cost much less than they will if the rails are placed the ordinary distance apart. *This is not true,* as any intelligent mechanic accustomed to work about cars and locomotives should know; yet we find college professors and papers devoted to the interests of railroads repeating it over and over again as though there could be no question about it. By constant reiteration, the idea that the cost is diminished by putting the rails nearer together has been so generally credited that some speak of "the additional cost of the standard gauge" and of "interest on the increased cost of the standard gauge" without ever stopping to think whether it is true or not. Now if it be true that by placing the rails nearer together the cost of railroads is materially diminished, then the narrow gauge is proved to have one advantage, and there is some reason for the adoption of a gauge different from that in ordinary use; but if, on the contrary, there is no difference which is worth taking into account, then the introduction of a new gauge with all its attending inconvenience and expense is simple folly. It is not said that a narrow-gauge road may not be built cheaply and operated profitably, but it is said that the cost would have been no greater and the profit no less if the road were made of the standard gauge. That a road of the standard gauge with heavy rails and rolling stock will cost more than one with light rails and rolling stock with a narrow gauge is of course true, but if those who make such assertions in order to show the advantages of the narrow-gauge would reflect a little, it might be possible for them to grasp the idea that roads of the standard gauge can be and have been built with rails and rolling stock just as light as that used on the narrow-gauge lines.

There is a peculiar mental condition, which might be called logical inversion, to which advocates of and believers in the narrow gauge doctrines are subject. They will assert in the most positive way that if the rails are placed near together three things will occur: First, the rolling stock will weigh and cost much less; second, the rails can therefore be lighter; third, the resistance on narrow-gauge curves is less than on those of a wide gauge, and therefore, owing to the possibility of adjusting the alignment of the road to the natural surface of the ground, and also to the narrowness of the road-bed, the quantity and cost of grading will be less. Now if in reply it is shown, first, that cars and engines can be and are built so as not to weigh or cost any more for the one gauge than for the other, and that therefore the rails may be of the same weight on each gauge, and that the difference in resistance on the two gauges is so small that it would require a very delicate instrument to detect it, and that therefore the curves can be and are made just as short on one gauge as on the other, and that practically the cross ties are made long enough on three-feet gauge roads to lay the rails 4 ft. 8½ in. apart—being obliged to admit all this, they assume a bold attitude by asking if that is so, then what is the use of making a road 4 ft. 8½ in. gauge? In such cases patience ceases to be a virtue, and cold water and a pump are the arguments which seem to be needed to vindicate the cause of truth and justice.

The Cincinnati, Hamilton & Dayton Railroad.

Reports have been current for several months of the embarrassed position of this company, but nothing definite was known until last week, when the announcement was made that the guaranteed interest due Jan. 1 on the bonds of the Cincinnati, Hamilton & Indianapolis Railroad would not be paid. This road was formerly known as the Junction Railroad and was bought by the Cincinnati, Hamilton & Dayton at foreclosure sale in 1872, and was reorganized under the present name. The Cincinnati, Hamilton & Dayton owns all the stock and $654,000 out of an issue of $2,500,000 of bonds, $1,846,000 being held by outside parties. This default was not unexpected, and is accompanied by a suggested compromise, to the effect that if the holders of the bonds will consent to reduce the amount of their bonds one-half, the company will agree to cancel all of its holding. Cincinnati dispatches say that this suggestion meets with little favor, and proceedings in bankruptcy are talked of, though no definite action has been taken as yet.

The company publishes the following statement for the six months from April 1 to Sept. 30:

	Earnings.	Expenses and interest.	Net earn. or deficit.	Net earn. or def., 1876.
Cin., Ham. & Dayton.	$474,464	$423,740	Net. $50,724	Net. $15,468
Dayton & Michigan..	445,795	459,018	Def. 13,223	Def. 54,100
Cin., Rich'd & Chic..	92,023	80,238	Net. 11,785	Def. 5,655
Cin., Ham. & Ind	173,194	252,242	Def. 79,048	Def. 134,845
Total.....	$1,185,476	$1,215,238	Def. $29,762	Def. $179,133

Showing a net gain this year of $149,371 over last year, in spite of a reduction of $31,100 in the gross earnings of the entire system. The present trouble, however, has probably come, not because there is a falling off in this year's receipts, but because the load has been carried as long as possible and the time has come when something must be done.

The Cincinnati, Hamilton & Dayton had, by its last report, a funded debt of $3,091,000 and a floating debt of about $680,000. This does not include the Cincinnati, Hamilton & Indianapolis guarantee, nor a guarantee of one-third of the interest on the bonds of the Cincinnati, Richmond & Fort Wayne, which required $25,752 to meet it last year. The company has a large amount invested in securities of its leased lines, inventoried in the last report at $967,121, and has claims against them for advances amounting to $1,500,056, of which $977,033 was to the Indianapolis road. These securities and claims are, of course, not available as assets, though charged as such in the accounts.

The Cincinnati, Hamilton & Dayton was formerly one of the most prosperous roads in the West. It had a very large traffic and for many years paid regular dividends of 8 and sometimes 10 per cent. Its business, however, has been much cut up by the building of competing lines, and its leased lines have, of late, been a heavy load to carry. The Cincinnati, Richmond & Chicago has generally paid its way, and the Dayton & Michigan did so for some time, though large advances were made to it when first built. It was, however, not an unprofitable line for a time, but new competing lines have reduced its earnings of late years and there was a considerable loss on its lease this year and last. The Cincinnati, Hamilton & Indianapolis has always been a very unfortunate investment. As the Junction Railroad, it was in a state of chronic bankruptcy; in 1872, when finally sold it was in a most wretched condition and it was necessary for the purchaser to spend a large amount upon it at once to put it in condition for profitable working. But in any case the road could hardly be worked profitably. Nearly all its business must be secured in face of sharp competition and consequently at rates which make it difficult to earn even the working expenses, much less the interest on a large debt. This has been somewhat improved by agreements lately made with rival roads, but the line is never likely to be a source of profit.

The bondholders can, of course, take no action until after the default has actually been made, and they can proceed against the Cincinnati, Hamilton & Dayton only as creditors having a claim subordinate to its own bondholders. It appears most probable that the matter will finally be compromised without proceeding to extremities.

The Cost of Working Continuous Brakes.

The Engineer of Nov. 9 of this year contains a very interesting report of the first cost and subsequent expense of maintaining the Smith vacuum and the Westinghouse automatic brakes, which were applied last year, by the North British Railway Company, to two experimental trains. After these experiments, to quote from *The Engineer*, "it was finally determined by the directors to put the two experimental trains in regular service, and ascertain what the running expenses of each amounted to as regards the brake gear, and to note at the same time all defects that might arise."

The cost of the Smith vacuum brake, per carriage, was $134.82, and for the engine $729.60 As there were ten carriages, including the "brake vans," the total cost of the brake for the whole train was $2,077.80, gold.

The cost of the Westinghouse automatic brake was $194.46 per carriage, and $426.03 for the locomotive. As there were the same number of vehicles in this train as in the other, the total cost of the brake for the whole train was $2,370.63.

It is said that owing to the necessity of making overtime in order to get the trains ready for the trials, this cost much higher than it would under ordinary circumstances, but what will probably surprise some readers here is the high cost of the vacuum brake and the comparatively low cost for the Westinghouse for the engine, and *vice versa* the low cost of the vacuum brake and the high cost of the Westinghouse for the carriages.

There is nothing said in the report of the exact length of time the trains have been in service. The Westinghouse train was, however, put into regular work on the 5th of February last, and the Smith train on the 5th of March, so the report is for less than a year.

The cost of maintenance was for the Smith train was $39.76 and for the Westinghouse $26.94. The principal part of the cost of repairs for the Smith brake was $25.92 "for twenty-four india-rubber tubes worn out." It is not clear what are meant, whether the tubes which connect the cars together, or the "accordion bags" as they are called in this country. The time of service, however, was too short to be any certain criterion of the ultimate cost of maintenance.

Grain Receipts at Atlantic Ports.

For the 33 weeks from the opening of navigation (April 15) to Dec. 1, receipts of grain of all kinds at the Atlantic ports and the proportion of the total receipts at each have been:

	1877 Bushels.	1877 Per cent. of total.	1876 Bushels.	1876 Per ct. of total.
New York	63,266,971	49.8	59,235,800	47.8
Boston	8,934,893	7.0	9,661,775	7.8
Portland	535,114	0.4	1,065,118	0.8
Montreal	12,960,474	10.2	11,410,612	9.2
Philadelphia	14,421,109	11.3	22,051,135	17.8
Baltimore	17,109,890	13.5	17,386,235	14.0
New Orleans	4,804,349	3.8	3,233,788	2.6
Total	127,071,800	100.0	124,064,413	100.0

At last we find the movement for this season exceeding that of last season. The comparison made four weeks ago showed 2,600,000 bushels less received at the Atlantic ports this year than last, since navigation opened; now we see that 3,000,000 bushels more have been received. In the four weeks of November 20,200,000 bushels were received this year against 14,700,000 last.

There is a marked difference in the distribution of the receipts, the proportion of New York having largely increased, and those of Montreal and New Orleans somewhat, while all the other ports show a smaller proportion this year, the decrease of Philadelphia, however, being much the greatest, and alone more than equaling the increase at New York. It is noticeable that the increases are all at places which receive chiefly by water. It is not easy to understand why there should be so great a falling-off at Philadelphia, while Baltimore has very nearly held its own.

Philadelphia and Baltimore together last year received 31.8 per cent. of the total and two-thirds as much as New York; this year they have received but 24.8 per cent of the total and not half as much (46 per cent.) as New York. As was to be expected, the considerable difference between rail and water rates has favored the places which have water routes. But this advantage now ceases—not with the date of the above table, however, for grain will continue to arrive at New York by canal probably as late as the date of this paper; but from the time when this meets the eye of the reader, the Atlantic cities will all have to depend upon the railroads, and we may no longer expect to see New York so decidedly ahead of Baltimore and Philadelphia. It has fared better recently than earlier in the season, its proportion for November being 71 per cent. of the total, while for the whole of the season, as we have seen, it was but 54 per cent. Generally, we may say, every advance in the rail rate has been followed by an increase in the proportion of the grain received at New York.

The shipments from the Northwest have now greatly fallen off, but they are still large for the season, and the receipts there are still unusually large for this time of the year. The stocks on hand are not now large, but if the arrivals keep up (and it is reported that they have been hindered recently by the state of the roads), shipments must be made more freely in order to dispose of them.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Columbus & Hocking Valley.—The *Snow Fork Branch* is completed from the junction with the Monday Creek Branch, at the mouth of Snow Fork, to Orbiston, O., 6 miles.

Worthington & Sioux Falls.—Extended from Luverne, Minn., west to Beaver Creek, 8 miles.

South Pacific Coast.—Extended from San Leandro, Cal., north to Alameda, 7 miles. The southern end of the road, from San Jose to Los Gatos, is 3 miles longer than heretofore reported. It is of 3 ft. gauge.

This is a total of 24 miles of new railroad. But we learn that the new road of the Pensacola & Mobile Railroad Manufacturing Co. is but 5 miles long instead of 16, as reported some weeks ago. This makes 1,977 miles completed in th

United States in 1877, against 2,177 miles reported for the corresponding period in 1876, 1,237 in 1875, 1,767 in 1874, 3,507 in 1873, and 6,885 in 1872.

Salisbury Iron.

In the report of the tests of Salisbury iron it was stated that the test pieces were made of Old Hill ore with about 2 per cent. of Amenia. We are requested to say that the "regular" practice of the Salisbury Company is to use one-half Davis, one-quarter Old Hill and one-quarter Chatfield. It happened accidentally at the time that the test pieces were made that the ore used was nearly all Old Hill.

NOVEMBER EARNINGS are reported for seventeen railroads, so far, of which twelve show increases, generally of moderate amounts, except where the road has an increased mileage. The decreases are also generally small.

NEW PUBLICATIONS.

The American Machinist, whose sub title is "a journal for machinists, engineers, founders, boiler-makers, pattern-makers, and blacksmiths," is a new venture in engineering literature. It is to be a monthly publication, very nearly of the size of the *Railroad Gazette*, and is profusely illustrated somewhat after the manner of the *Scientific American*. The appearance and make-up of the paper are very good, although some of the engravings have done duty "full many a time and oft" as advertisements. The want which this new paper has undertaken to fill is one which has long been felt in this country and in which abundant success awaits the enterprise which supplies the want. The new paper is published by Messrs. Miller & Bailey at No. 88 Warren street, New York.

TRAFFIC AND EARNINGS.

Railroad Earnings.

The following are reports made to the various State authorities for the year ending Sept. 30, 1877:

	Earnings.	Expenses.	Net earnings.	Earnings per mile.	P. c. of exps.
Boston, Barre & Gardner	$150,433	$140,454	$9,979	$2,893	93.63
Bost., Clinton, Fitchburg & New Bedf'd.	1,033,733	804,012	228,721	6,839	77.88
Brooklyn, Bath & Coney Island	58,338	41,087	17,251	8,334	70.84
Cooperstown & Susquehanna Valley	34,265	.....	.....	2,142	....
Fitchburg	1,806,322	1,363,676	442,646	9,557	75.51
Harlem Extension	269,960	287,031	17,071	2,477	106.31
New Haven & Northampton	564,366	333,122	231,244	5,212	59.06
New York & Oswego Midland	568,204	530,164	38,040	1,943	93.31
Shepaug	49,079	38,041	11,038	1,519	77.92

Other earnings have been reported as follows:

Year ending Sept. 30:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Chesapeake & Ohio	$1,702,533	$1,599,513	Inc. $103,020	6 4
Expenses	1,363,225	1,243,036	Inc. 120,189	9.7
Net earnings	$339,308	$356,477	Dec. $17,169	4.8
Earnings per mile	3,956	3,717	Inc. 239	6.4
Per cent. of expenses	80.07	77.72	Inc. 2.35	3.0

Eleven months ending Nov. 30:

	1877.	1876.		
Atchison, Topeka & Santa Fe	$2,432,925	$2,282,298	Inc. $150,627	6.6
Burlington, Cedar Rapids & Northern	1,120,327	1,037,583	Inc. 82,744	8.0
Central Pacific	15,329,107	16,699,795	Dec. 1,370,688	8.2
Chicago & Alton	4,148,774	4,586,177	Dec. 437,403	9.5
Chi., Milwaukee & St. Paul	7,447,460	7,443,882	Inc. 3,578	...
Denver & Rio Grande	706,748	384,439	Inc. 322,309	83.8
Grand Trunk	8,640,109	8,663,796	Dec. 23,687	0.3
Great Western, of Canada	3,619,269	3,731,721	Dec. 112,452	3.0
Hannibal & St. Joseph	1,882,040	1,745,578	Inc. 136,462	7.8
Kan-as Pacific	3,022,672	2,783,872	Inc. 238,800	8.6
Missouri Pacific	3,536,302	3,390,307	Inc. 145,995	4.3
Missouri, Kansas & Texas	2,918,299	2,920,813	Dec. 2,514	0 1
St. L., Alton & T. H., Belleville Line	474,804	444,444	Inc. 30,360	6.8
St. Louis, Iron Mt. & So.	3,968,988	3,494,288	Inc. 474,708	13.6
St. Louis, Kan. City & No.	2,891,729	2,875,872	Inc. 15,857	0.6
St. Louis & San Francisco	1,211,872	1,225,185	Dec. 13,313	1.1
Southern Minnesota	621,237	531,133	Inc. 40,104	6.9
Toledo, Peoria & Warsaw	1,017,981	1,313,687	Dec. 295,706	22.5
Wabash	4,133,909	4,011,547	Inc. 122,362	3.1

Month of October:

Atlantic & Great Western	$415,072	$335,131	Inc. $70,941	23.9
Central, of Iowa	106,778	.....	.....	....
Net earnings	45,213	.....	.....	....
Per cent. of expenses	57.54	.....	.....	....
Great Western, of Canada	436,500	391,800	Inc. 44,700	11.4
Net earnings	165,600	95,200	Inc. 70,400	73.9
Per cent. of expenses	62.08	75.70	Dec. 13.62	18.0

Month of November:

Atchison, Topeka & Santa Fe	$335,675	$215,955	Inc. $109,720	48.5
Bur., Cedar Rap. & North'n.	138,985	94,908	Inc. 44,077	46.8
Central Pacific	1,597,000	1,675,532	Dec. 78,532	4.7
Chicago & Alton	392,846	367,898	Inc. 24,948	6 8
Chi., Milwaukee & St. Paul	892,000	765,230	Inc. 126,770	16.6
Denver & Rio Grande	81,337	49,988	Inc. 31,349	62.7
Hannibal & St. Joseph	174,749	154,857	Inc. 19,892	12.8
Kansas Pacific	350,418	283,691	Inc. 66,727	23.5
Missouri Pacific	346,811	338,943	Inc. 8,268	2.4
Missouri, Kansas & Texas	274,184	324,884	Dec. 50,700	15.6
St. Louis, Alt. & T. H., Belleville Line	47,764	48,651	Dec. 887	1.8
St. Louis, Iron Mt. & So.	452,900	450,332	Inc. 2,568	0.6
St. Louis, Kan. City & No.	312,338	282,795	Inc. 29,543	10.4
St. Louis & San Francisco	114,204	122,011	Dec. 7,807	6.4
Southern Minnesota	85,000	71,450	Inc. 13,550	19.0
Toledo, Peoria & Warsaw	92,086	101,075	Dec. 8,989	8.8
Wabash	407,373	366,509	Inc. 40,864	11.1

Week ending Nov. 30:

Great Western, of Canada	$83,592	$71,380	Inc. $12,212	17.1

Week ending Dec. 1:

Grand Trunk	$202,509	$160,828	Inc. $41,681	25.9

Six months ending Oct. 31:

Houston & Texas Central	$1,206,408	$1,384,295	Dec. $177,887	12.9
Net earnings	444,681	432,483	Inc. 12,098	2.8
Per cent. of expenses	63.17	68.77	Dec. 5.60	8.1

Iron Ore Movement.

Shipments of iron ore from the Lake Superior region up to the end of November were as follows:

	1877.	1876.	Inc. or Dec.	P. c.
From Marquette, tons	521,743	457,976	Inc. 63,767	13.9
From L'Anse	59,571	88,962	Dec. 29,391	33.0
From Escanaba	383,743	368,971	Inc. 14,772	4.0
Total	965,057	915,909	Inc. 49,148	5.4

The Marquette *Mining Journal* says: "It is proper to say, however, that the difference in the consumption of ore at local furnaces and shipments by rail will more than overbalance this increase in lake shipments, so that the final summing up will show a considerable falling-off, as compared with the total output of the mines in 1876."

Lake and Canal Rates for the Season.

The Buffalo *Commercial Advertiser* of Dec. 10 says: "The season of lake navigation may now be regarded as closed. The Francis Palms, one of the last schooners from this port, has arrived at Chicago, and the propeller Jarvis Lord, among the last to leave that port, and which was detained several days by grounding in the river, arrived here in safety this morning. But the bulk of the business closed with November. The following exhibit shows the average freight rates by lake, on wheat and corn from Chicago to Buffalo; also the average canal rates, on the same cereals, for November, in a series of years:

	Lake.		Canal.	
Years.	Wheat. Cts.	Corn. Cts.	Wheat. Cts.	Corn. Cts.
1868	9.3	8.3	19.2	16.2
1869	10.3	9 8	21.7	19.0
1870	8.5	7.6	11.9	11.5
1871	10.1	9.7	15.9	14.1
1872	12.4	11.4	16.0	14.0
1873	7.4	6.9	12.3	10.6
1874	4.6	4.2	9.7	8.7
1875	5.9	5.6	10.5	9 1
1876	3.7	3.3	7.5	6.9
1877	4.5	3.9	10.0	8 7

"From this it will be seen that the average by lake for last month is higher than for November, 1876, but it is lower than for any preceding November. This shows how much in excess of an ordinary season's work the lake tonnage is at present. The movement of grain was large; but the competition was so great that rates could not be kept much above actual cost. The addition to the fleet of the new propellers now building will make the situation even worse.

"The showing for the canal was better. Allowing for the difference in tolls, the rates were higher than for any corresponding month in several years."

Grain Movement.

For the week ending Dec. 1 receipts and shipments of grain of all kinds were, in bushels:

	1877.	1876.	Increase.	P. c.
Lake ports' receipts	3,101,359	2,645,154	456,205	17.3
" " shipments	1,862,943	1,733,999	128,944	7.4
Atlantic ports' receipts	5,480,035	3,883,995	1,596,040	41.1

Of the shipments from lake ports, 35⅕ per cent. were by rail this year, against 40 per cent. in 1876, 40¾ in 1875 and 56⅕ in 1874.

Of the receipts at Atlantic ports, 81.3 per cent. were at New York, 5.7 at New Orleans, 5.3 at Baltimore, 3.5 at Philadelphia, 3.5 at Boston, 0.6 at Portland, and 0.1 at Montreal.

For the eleven months from Jan. 1 to Dec. 1 receipts and shipments have been, flour in barrels and grain in bushels:

	1877.	1876.	Inc. or Dec.	P. c.
Flour:				
Lake ports' receipts	4,583,679	5,141,454	Dec. 557 775	10.8
" " shipments	4,816,407	4,563,077	Inc. 253,330	5.5
Atlantic ports' receipts	7,619,163	9,240,860	Dec. 1,621,697	17.5
Wheat:				
Lake ports' receipts	49,402,894	52,743,534	" 3,340,640	6.3
" " shipments	42,388,722	47,437,633	" 5 048,911	10.6
Atlantic ports' receipts	42,911,842	40,458,323	Inc. 2,453,519	6 1
Corn:				
Lake ports' receipts	74,670,063	75,757,718	Dec. 1,087,655	1.4
" " shipments	66,089,793	72,542,884	" 6,453,091	8.9
Atlantic ports' receipts	80,651,427	82,185,673	" 1,534,246	1.9
Grain of All Kinds:				
Lake ports' receipts	159,699,097	163,001,716	" 3,302,619	2 0
" " shipments	133,605,121	145,493,066	" 11,817,945	8.1
Atlantic ports' receipts	154,191,578	154,932,011	" 740,433	0.5

For five years the movement of grain of all kinds for the corresponding eleven months has been:

	1877.	1876.	1875.	1874.	1873.
Lake ports' receipts	159,699,097	163,001,716	145,412,352	169,679,053	157,309,573
Lake ports' shipments	133,605,121	145,423,066	120,805,690	125,399,762	130,247,311
Atlantic p'rts receipts	154,191,578	154,932,011	130,368,538	138,722,370	118,494,736

Thus the lake ports' receipts this year have been exceeded twice, their shipments once, and the Atlantic ports' receipts once.

San Francisco wheat exports for November were: 1877, 747,628 bushels; 1876, 2,612,138 bushels; decrease, 1,864,510 bushels, or 71.4 per cent.

Coal Movement.

Coal tonnages are reported as follows for the eleven months ending Nov. 30, the tonnage given in each case being only that originating with the line to which it is credited:

	1877.	1876.	Inc. or Dec.	P. c.
Anthracite:				
Philadelphia & Reading	6,288,272	4,595,805	Inc. 1,686,467	36.7
Northern Central:				
Sum'it Branch R.R. and Shamokin Div.	665,562	889,975	Dec. 224,413	25.2
Central of N. J., Lehigh Div.	2,608,276	2,554,192	Inc. 54,084	2.1
Danville, Hazleton & Wilkesbarre	31,041	40,438	Dec. 9,397	23.3
Pennsylvania Canal	340,231	407,522	Dec. 67,291	16.5
Lehigh Valley	3,912,677	3,484,518	Inc. 428,159	12.3
Pennsylvania & N. Y.	40,990	23,226	Inc. 17,764	76.6
Delaware, Lack'wan'a & Western	1,793,034	1,785,856	Inc. 7,078	0 4
Delaware & Hudson Canal Co.	1,689,762	1,827,783	Dec. 138,021	7.6
Pennsylv'a Coal Co.	957,148	1,007,830	Dec. 50,682	5.0
State Line & Sullivan	18,762	30,051	Dec. 11,289	37.6
Total anthracite	18,340,755	16,647,696	Inc. 1,693,059	10.2
Semi-bituminous:				
Cumberland, all lines	1,448,891	1,605,191	Dec. 156,300	9.7
Huntingdon & Broad Top	128,876	148,114	Dec. 19,538	13.2
Tyrone & Clearfield	1,274,521	1,117,923	Inc. 156,598	14.0
Total semi-bitumin's	2,851,988	2,871,228	Dec. 19,240	0.7
Bituminous:				
Barclay	304,922	326,273	Dec. 21,351	6.5

The anthracite business shows many changes, but as in previous months the total increase is very nearly the same as that of the Reading alone, the rest of the trade giving almost exactly the same tonnage this year as last. The year's tonnages of the Reading and the Lehigh Valley, whose fiscal years end Nov. 30, are given below.

The Cumberland shipments for the last week are seriously affected by damage done to railroad and canal outlets by the late freshets.

The anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the eleven months ending Dec. 1, was as follows:

	1877.	1876.	Inc. or Dec	P. c.
Coal Port for shipment	54,390	286,866	Dec. 232,476	81.0
South Amboy for shipment	495,943	411,806	Inc. 84,137	20.4
Local distribution on New Jersey lines	179,735	168,470	Inc. 11,265	6.7
Company's use on New Jersey lines	65,784	65,028	Inc. 756	1.2
Total	795,852	932,170	Dec. 136,319	14.6

Of the total this year, 632,993 tons were from the Lehigh and 162,859 tons from the Wyoming Region.

The coal tonnage of the New York State canals from the opening to Nov. 30 was:

	1877.	1876.	Inc. or Dec.	P. c.
Anthracite	951,159	765,273	Inc. 185,886	24.4
Bituminous	240,433	287,441	Dec. 47,008	16.4
Total	1,191,592	1,052,714	Inc. 138,878	13.2

The following reports are for the full year, the fiscal year of these companies ending Nov. 30:

Philadelphia & Reading:	1876-77.	1875-76.	Inc. or Dec.	P. c.
Anthracite	7,099,111	5,423,392	Inc. 1,675,719	30.9
Bituminous	156,206	171,815	Dec. 15,609	9.1
Total	7,255,317	5,595,207	Inc. 1,660,110	29.7
Lehigh Valley, anthracite	4,362,124	3,951,513	Inc. 410,611	10.0

The Reading tonnage includes 394,546 tons for company's use last year, and 338,144 tons for company's use the preceding year.

A meeting of representatives of the anthracite companies was to be held in New York, Dec. 13, and it is said that the object of the meeting was the formation of a new combination. Some informal preliminary conferences are reported to have been held.

The plan to be submitted to this meeting, as published in Philadelphia, apparently by authority of Mr. Gowen, provides for the management of the anthracite business, including that controlled by the Pennsylvania Railroad Company, by a board, which is to apportion to each company its production and to have power to order limited suspensions of work when necessary. To prevent production in excess of the apportionment, each company is to be liable to fines for over-production, and is to deposit with the committee a certain sum from which such fines may be deducted. Provision is made for a division of trade and other details.

West-Bound Freight Rates.

A considerable change went into effect Monday, Dec. 10, in the tariff on shipments westward from the seaboard cities. The old and new rates from New York to Chicago are:

	1st class.	2d class.	3d class.	4th class.
Old rates	$1 00	$0.90	$0.75	$0.45
New rates	1.00	0.80	0.60	0.45

This is a reduction of 12½ per cent. in the second and 20 per cent. in the third-class rate; but it was not made so much for the purpose of reducing as of equalizing changes. The differences in the rates were chiefly between the third and fourth class by the old tariff, the third class being 66⅔ per cent. higher than the first.

Chicago to Europe via New Orleans.

Chicago advices say the Illinois Central Company expects to be ready to take grain and hog products for Europe via New Orleans about Dec. 20. Arrangements are now being completed with the New Orleans & Liverpool Steamship Line. The rates on grain will be 40 cents per 100 lbs. from Chicago to New Orleans, and 70 cents to Liverpool. The distance from Chicago to New Orleans is 913 miles, or almost exactly the same as from Chicago to New York by the Pennsylvania. The current rate from New York to Liverpool is about 16 cents a bushel, against 30 cents for the ocean rate and terminal at New Orleans.

Water Rates.

The Chicago *Inter-Ocean* says: "Anticipating stiff opening rates in the spring, and wishing to save elevator storage charges, there is quite a demand now for vessels to load grain and hold it on board until navigation opens again, the rate to be then paid on cargoes of corn to Buffalo being 4 cents per bushel, vessels not to be responsible for any damage that might be suffered during the winter months. Vessel owners are asking 5 cents on corn with these conditions, and at present seem tolerably firm in their views."

Tuesday's quotations of ocean rates from New York are 8¼d. per bushel for wheat, and 40s. per ton for cheese by steam to Liverpool; 2s. 6d. per barrel for flour, and ⅝d. per pound for cotton by sail to Liverpool; and by steam to London, cheese at 40s. per ton, hops at ½d. per ton, pork at 4s. per barrel, and grain at 8¼d. per bushel.

Provision Movement.

The winter hog packing of the West for the first four weeks of the season is reported to have been 1,136,258 hogs this year, against 1,325,376 last, a decrease of 189,118, or 14¼ per cent.

The exports of provisions for the five weeks from Oct. 27 to Dec. 1 were 61,607,307 lbs. this year and 84,650,545 lbs. last year, a decrease of 23,043,238 lbs., or 27¼ per cent.

THE SCRAP HEAP.

Railroad Manufactures.

The Pittsburgh Chain & Car Link Co., at Rochester, Pa., recently shipped several tons of finished work to St. Louis.

The Union Pacific rolling mills at Laramie, Wy. Ter., are making light iron rails for the extension of the Utah Northern road.

The Red Jacket Furnace, at New Castle, Pa., recently made 470 tons of Bessemer pig iron in one week. The furnace is 16 ft. bosh and 60 ft. high.

It is reported that the Cleveland Rolling Mill Co. has a contract for 7,500 tons of steel rails for the Pittsburgh & Lake Erie road.

Bolton, Myers & Co., of the Canton (O.) Steel Works, report heavy orders and a prospect for a good Winter's trade.

The new Vilas Furnace, near Shawnee, O., has gone into blast and is making 20 tons of pig iron per day.

The furnace and rolling mill of the Belfont Iron Works, at Ironton, O., are running full time on orders.

The first complete locomotive ever built in the State of Mississippi was recently turned out of the Chicago, St. Louis & New Orleans shops at Water Valley, Miss. The event was celebrated by a grand ball.

The property of the Arlington Car Manufacturing Co., at Arlington, Vt., which has been in the hands of a receiver for a year past, has been taken by the First National Bank of North Bennington, under the court appraisal, at $25,000.

Porter, Bell & Co., at Pittsburgh, recently shipped a narrow-gauge freight locomotive to Cuba, also one to the Colorado Central, the sixth they have furnished to that road; one locomotive to a road in Kentucky; also a small standard-gauge engine to the Lake George & Muskegon River road in Michigan, and a narrow-gauge tank engine to a lumber road at Ramey, Pa., which is laid with 16 lbs. rails and cost $2,000 per mile. They have under way one of their street railroad locomotives to go to San Francisco, and are busy on orders for locomotives mostly for distant points, including Washington Territory, Louisiana, Michigan and South Carolina.

McVey, Walker & Co., at Braddock's Field, Pa., are building some narrow-gauge cars for the Ligonier Valley road.

The Louisville Bridge & Iron Co. has the contract for two spans of through combination triangular truss, each 100 feet long, on the Tennessee & Pacific Railroad.

Knauer & Moret are building a new steam forge at Douglasville, Berks County, Pa., which will employ 40 men.

Seath & Hager, at Terre Haute, Ind., are building 50 four-wheel coal cars for the Paducah & Elizabethtown road.

The Indianapolis, Cincinnati & Lafayette shops at Cincinnati recently turned out two new baggage cars each 60 feet long, for use on the through express trains of the road.

The works of the Joseph H. Brown Iron & Steel Co., at South Chicago, will be ready to start about Jan. 1.

The Griffin Car Wheel Co., at Detroit, Mich., is making 25

car wheels a day, and the foundry is also turning out car and bridge castings.

The Missouri Car & Foundry Co., at East St. Louis, is building 25 freight cars for the St. Louis, Alton & Terre Haute, and 100 ore cars for the Beaver Branch road.

The Baldwin Locomotive Works, at Philadelphia, recently received an order for five narrow-gauge engines for the South Pacific Coast road.

The Jackson & Woodin Manufacturing Co., at Berwick, Pa., is building a number of freight cars for the Rochester & State Line road.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.

This company gives notice that the whole issue of $700,000 12 per cent. land income bonds, dated Jan. 1, 1874, will be paid at the company's office, Equitable Building, Boston, on Jan. 1, 1878, and interest thereon will cease from that date. The company will issue 5-10 year 8 per cent. land income bonds to the amount of $480,000, and holders of the above called bonds may exchange for the new 8 per cent. bonds at par, at their option, to the extent of the new issue.

Atlantic & North Carolina.

The case of Hawkins against this company came up in the United States Circuit Court at Raleigh, N. C., Dec. 10. The plaintiff asks for a foreclosure of the first mortgage and the appointment of a receiver pending the suit. The company resists, and besides other defense pleads that the bonds are tainted with usury, the interest being 8 per cent. A petition to be allowed to interplead was filed by some holders of the bonds issued in 1857 by the State of North Carolina to pay for its stock in the road, the ground of the petition being that the stock is pledged as security for those bonds, and a foreclosure will destroy its value. Argument was expected to continue for several days.

Belton Tap.

It is proposed to build a railroad from Belton, Tex., eastward to Hearne, the crossing of the Houston & Texas Central and the International & Great Northern roads. The distance is about 60 miles through a good country, which is said to be fast filling up with settlers.

Boston, Hoosac Tunnel & Western.

The Boston *Herald* says of the work on this road: "Beginning at Mechanicsville on the west bank of the Hudson, about 19 miles above Albany, a large force of men is engaged in grading and preparing the road bed for the rails. The junction with the Delaware & Hudson Company's road at this point has been completed, and the new road, which runs just west of the Champlain Canal, and parallel to it for three-quarters of a mile, is apparently finished, with the exception of tracklaying The new bridge across the Hudson River is making rapid progress. Three of the eight piers to be erected in the river are now in process of construction. The stone, which is quarried about 70 miles north, on the line of the Champlain Canal, is being delivered at the rate of twenty-one loads per day. A track has been laid from the bank of the Hudson River to the canal. Here another track begins, which is extended some 400 feet, and on which the stone is transported to the different piers. About forty stone-cutters are engaged in the stone-yard, which is a part of the farm of Mr. Holmes, and is situated between the canal and the river. The piers are to be 35 feet high, and of sufficient width for a double track. The contract is made for the completion of this portion of the work with Messrs. Smith & Ripley of New York city and others. The bed of the river is solid rock, which is excavated about two feet below the top, for the foundation of the piers. The work is to be completed by the middle of March next, and the contract calls for a double-track bridge, with nine spans crossing the river, with iron girders and braces extending back 2,100 feet at either end of the bridge. The height of the bridge above the water will be about 65 feet, and the work is to be entirely completed and delivered to the company, with the tracks laid, on or before the 1st of April next. Coming eastward, the work for three or four miles is very heavy, consisting of constant alternate cuts and fills, there being upward of 100,000 cubic yards of excavation in a single mile. The fourth mile, however, brings the line to the table-lands west of the Hudson, and a long cut opens through to the valley of the Hoosac River, following the Hoosac, with no grades over 25 feet to the mile, and for nearly all the way with less than twelve feet to the mile. At Schagticoke the line comes into close proximity with the Troy & Boston Railroad, but on a grade 86 feet below it. From this point the line of the new road follows close along the bank of the river, in some places with very heavy work, which is now under contract at every point. Coming to Eagle Bridge, about 18 miles from the Hudson River, it is to be observed that the dwelling-houses and buildings which were upon the road-bed have been removed, and the junction of the new road with the Rutland & Boston Railroad at this point has been completed, the switches are set, and the side-track laid, and a large force is engaged in grading from here eastward. At this point the Troy & Boston and the new road are within 50 feet of each other. But the new road is upon a lower grade. Here it crosses the Hoosac River, coming up the Hoosac Falls on the left or north bank of the stream. From Eagle Bridge to Hoosac Falls, a distance of four miles, the line, as located, is almost straight, with no grades over 18 feet to the mile. * *

"It is intended to open the entire line from the Delaware & Hudson road at Mechanicsville to the Troy & Greenfield Railroad before the 1st of June next. West of the Hudson from Mechanicsville arrangements for the work are now in active progress. The distance from Mechanicsville to Schenectady is 14¼ miles. The road is to be built jointly by the Delaware & Hudson Company and the new company, with double tracks, each building one track and operating it as a double-track road. The surveys were completed last week, and they show a very short and easy-grade line. There are no grades in either direction in any one mile of over 21 feet. Until the completion of this connection the Delaware & Hudson Company agree to carry all the freight and passengers by way of Ballston, over the routes of Schenectady and Saratoga, and Troy and Saratoga, making the distance from Schenectady to Mechanicsville about 20 miles. The new road will make a saving of 5¼ miles in distance. The new line, as surveyed and located, makes the distance from Boston to Schenectady 200 miles, one mile shorter than the distance from Boston to Albany."

Boston & Mystic Valley.

This company has secured subscriptions enough to the stock to organize under the general law, and application has been made for the required certificate. The company purposes building a narrow-gauge road from Boston northwest to Winchester, about eight miles. The road will come in direct competition with the Boston & Lowell.

Burnett County.

It is proposed to build a narrow-gauge road from some point on the St. Paul & Duluth Railroad eastward into Burnett County, Wisconsin, where there is a considerable population. The county will be asked to vote a bonus of $60,000, and it is thought that a grant of swamp lands can be procured from the State for the 30 miles of the road in Wisconsin. The road will be about 40 miles long.

Central, of Iowa.

The Special Master, appointed by the United States Circuit Court to take the votes of the bondholders on the various plans of reorganization, reports that 526 holders, representing $2,193,500 of bonds, have voted for the original or committee plan, while 14, representing $398,000, have voted for the Cowdrey-Sage plan.

Cairo & St. Louis.

The Union Trust Company, trustee, on Dec. 6, filed a bill of foreclosure of the first mortgage in the United States Circuit Court at Springfield, Ill., and a petition asking for the appointment of a receiver pending the suit. The Court granted the petition and appointed Mr. Henry W. Smithers, of New York, Receiver. Mr. Smithers is President of the Paducah & Elizabethtown Company. The Receiver is authorized to pay claims for back wages and also certain claims for supplies furnished, provided the earnings of the road are sufficient.

The Cairo & St. Louis road is of 3 ft. gauge, and is 146 miles long, from East St. Louis to Cairo, Ill. It has never been a prosperous road and of late has been especially unfortunate, having failed in suits to compel the issue of municipal bonds voted in its aid, and having lost considerably by the failure of a tunnel and by repeated destruction of its road near Cairo by the Mississippi.

Canada Central.

A dispatch from Ottawa says that this road was transferred to the Brockville & Ottawa Company on Dec. 7. The road is in operation from Ottawa to Pembroke, 105 miles, connecting with the Brockville & Ottawa at Carleton Place, 30 miles from Ottawa. It has a grant from the Government in aid of a further extension, and was intended to be an eastern connection of the Canadian Pacific. The terms of the transfer are not stated, but there has been heretofore a close connection between the two companies.

Central, of Georgia.

This company has for some years operated the Upson County Railroad, from Barnesville to Thomaston, 16½ miles. The road has usually earned less than its expenses and the taxes for four years past are unpaid. Recently the Sheriff of the county levied upon the road for these taxes and the penalties thereon. Under instructions from the Attorney General of Georgia, he offered to remit the penalties, provided the Central Company would pay the taxes and fees, amounting to about $2,500. This the company declined to do, and the road is now advertised for sale for the full amount of taxes, fees and penalties for non-payment, amounting to nearly $10,000. The road will probably be sold.

Central of New Jersey.

This company gives notice of application to the New Jersey Legislature for authority to reduce the amount of its capital stock not exceeding 20 per cent., and to issue preferred stock or income bonds, or both, to an amount not exceeding $10,000,000, and to further mortgage its property. This authority will be necessary, if the plan of reorganization is carried out without a foreclosure.

It is reported that some large holders of the consolidated bonds have decided to begin an independent suit to foreclose that mortgage. They claim that the Receiver has acted too much in the interest of the floating debt creditors, and they do not, it is said, approve of the plan of reconstruction, believing that too much has been conceded to the stockholders.

Another account is that the suit is to brought chiefly to test the general feeling among the bondholders. If a considerable number are willing to join in it, it will be continued; otherwise it will not be pressed.

Central Pacific.

It is stated that this company has concluded an agreement by which the use of the telegraph wires over all its lines is to be given to the Western Union Telegraph Company. The Western Union is to operate and maintain the lines and to do all the railroad business over them. This arrangement will take effect Jan. 1.

Cincinnati & Portsmouth.

This company has executed a mortgage for $500,000 and expects to issue bonds to that amount for the purpose of completing its road.

Cincinnati, Sandusky & Cleveland.

An adjourned meeting of bondholders was held in Boston, Dec. 7, when the committee presented a report on the condition of the road. The report recommends that President and Receiver Farlow be replaced by a new receiver, chiefly on the ground that he is a large owner in the Columbus, Springfield & Cincinnati road, and therefore not the best man to represent the Sandusky Company in a settlement of matters arising under the lease. The report gave rise to a long discussion. Mr. Farlow claimed that his official action had been just and impartial; he was not able to take immediate charge of the road himself, but was willing to appoint as general manager some person who was acceptable to the bondholders. He protested against any action to remove him as unjust, and said that the committee had not made a full examination of the road or of the books, although pressed by him to do so.

Other speakers supported the committee report. Finally the whole question as to action for the removal of Mr. Farlow and the appointment of a new receiver was referred to a committee, consisting of Frank Thompson, C. L. Young and Edward F. Davis, who are to report to an adjourned meeting.

Charlottesville & Rapidan.

A company by this name has been organized in Virginia, under a charter granted some years ago, to build a railroad from Charlottesville east by north to some point on the Virginia Midland. The object is not clearly apparent, unless it is to supply the Midland with a new line between Charlottesville and Gordonsville, where it now uses the track of the Chesapeake & Ohio Railroad.

Chesapeake & Ohio.

Receiver Wickham has paid over to the State Auditor of Virginia $98,487.97, being the amount of the judgment for back taxes recently entered against the road. The amount is considerably less than that originally claimed by the State, the sum to be paid having been fixed by a compromise. The judgment entered was merely a ratification by the Court of the Receiver's agreement.

Chesapeake & Ohio Canal.

It appears that the damages resulting from the late freshet are sufficient to stop navigation for the season. The Cumberland (Md.) *Alleganian* says: "As the canal will not be repaired and ready for shipping before April next, all the officers at this point, together with the lock-keepers, will be relieved from duty and pay stopped from the 15th instant. This will be a great saving to the company, and shows the officers of the canal company are determined to economize and bend all their energies and means to the repairing of the damages by the late freshet."

Columbus & Gallipolis.

The directors have awarded the contract for the construction of this road to Hill & McKechnie, of Chicago, the contract including the rails and tracklaying, everything except the equipment. Sixty-three miles, from Columbus southeast, are to be laid with steel, the rest of the road with iron rails. The line of road is from Columbus, O., south by east to Gallipolis on the Ohio River, about 95 miles. Some grading was done on the road about five years ago.

Columbus & Hocking Valley.

The Snow Fork Branch is now completed to Orbiston, O., six miles from the junction with the Monday Creek Branch at the mouth of Snow Fork, and nine miles from the main line at Nelsonville. This place is to be the terminus for the present. About eight miles more of the Monday Creek Branch are under contract, with work progressing well.

Denver & Rio Grande.

The Auditor's report for the month of August is as follows:

Freight earnings	$50,153 43
Passenger earnings	33,950 58
Miscellaneous earnings	468 11
Total ($278.20 per mile)	$84,572 12
Expenses (45.48 per cent.)	38,462 36
Net earnings ($151.68 per mile)	$46,109 76

The gross earnings include $2,245.83 from troops, mails and Government freight. The mileage reported for the month is 304 miles.

Denver & Georgetown.

A company has been organized to build a narrow-gauge road from Denver, Col., to Georgetown, about 55 miles. The road is to be built on what is known as the Rogers survey, up Ralston Creek, which is a little longer than the Colorado Central, but is said to have better grades. The new organization is controlled by parties interested in the Boston & Colorado Smelting Works at Black Hawk.

Denver & South Park.

A company by this name has been organized in Denver, Col., for the purpose of completing the Denver, South Park & Pacific road. The first work to be done is the extension from the present terminus at Morrison, Col., to Fairplay, and the new company intends to begin work at once.

Detroit & Bay City.

Citizens of East Saginaw, Mich., are negotiating with this company for the construction of a branch from Vassar a little north of west to East Saginaw. The distance is about 15 miles.

Detroit, Eel River & Illinois.

The bondholders, who bought this road at foreclosure sale, have completed the organization of a new company, and last week filed the necessary certificates in the State of Indiana. The capital stock is fixed at $4,000,000. The road extends from Butler, Ind., west by south to Logansport, 93 miles.

Delaware, Lackawanna & Western.

It is reported as we go to press that President Sloan has issued an order requiring all locomotive engineers on the road, who are members of the Brotherhood of Locomotive Engineers, to give up their membership in the Brotherhood, by Jan. 1, or to leave the company's employ.

Dividends.

Dividends have been declared as follows:

New York, New Haven & Hartford, 5 per cent., semi-annual, payable Jan. 2.

Richmond & Petersburg, 2 per cent., payable Jan. 14. This is, we believe, the first dividend since the war.

Augusta & Savannah (leased to Central of Georgia), 3½ per cent., semi-annual, payable on demand.

New York Central & Hudson River, 2 per cent., quarterly, payable Jan. 15. Transfer books close Dec. 15.

New York & Harlem (leased to New York Central & Hudson River), 4 per cent., semi-annual, payable Jan. 2.

Morris & Essex (leased to Delaware, Lackawanna & Western), 3½ per cent., semi-annual, payable Jan. 2.

Lehigh Valley, 1 per cent., quarterly, payable Jan. 15. Transfer books will close Dec. 22.

Western Union Telegraph, 1¼ per cent., quarterly, payable Jan. 15.

East & West Texas.

Work has been begun on the extension of this road to the old town of Nacogdoches, Texas. The people of that town have subscribed work instead of money, and have agreed to grade the road from the town to the Angelina River.

Erie.

The Farmers' Loan & Trust Company has brought a counter suit against James McHenry and others, asking that the suit brought by them recently be stayed and that they be enjoined from further proceedings. The complaint denies all the allegations in the McHenry suit and claims that the complainants in that suit have not properly verified their claim to a standing in the case, and have further no right to ask for a foreclosure of the first consolidated mortgage, as they have never given the required notice to the trustee.

The Court has granted a temporary stay of proceedings, and an order to the defendants (the plaintiffs in the McHenry suit) to show cause why a permanent stay and injunction should not be granted.

Mr. George Ticknor Curtis, Referee, announces that the foreclosure sale under the decree recently granted will take place at the Merchants' Exchange Sales Room, No. 111 Broadway, New York, on Jan. 21, 1878, at noon.

The Port Jervis *Gazette* reports freight business on the road unusually heavy. For the week ending Dec. 7 the number of loaded cars bound east which passed through that place was: Freight, 3,706; coal, 4,076; total, 7,782, against freight, 3,422; coal, 2,858; total, 6,280, for the same period in 1876, showing an increase of 284 cars of freight and 1,218 cars of coal, in all 1,502 loaded cars, or 23.9 per cent. All the available cars and locomotives on the Eastern and Delaware divisions are in constant use.

Eureka & Eel River Valley.

It is proposed to build a railroad from Eureka, in Humboldt County, Cal., southward to the Eel River Valley. The distance is about 25 miles, and a subsidy is to be asked from the county.

Galveston & Camargo.

A company was recently organized at Galveston, Tex., to build a railroad from that city southwest to Rio Grande City, on the Rio Grande, opposite Camargo, Mexico. The distance is about 350 miles. A bill has been introduced in Congress to grant aid in the construction of the road on the ground that it is necessary for the transportation of troops and supplies for the defense of the frontier.

Greenville, Columbus & Birmingham.

This road is intended to run from Greenville, Miss., on the Mississippi River, nearly due east to Birmingham, Ala., the crossing of the South & North Alabama and the Alabama & Chattanooga roads, a distance of 255 miles. The first section to be built is from Greenville to the crossing of the Chicago, St. Louis & New Orleans road, 85 miles. The road is being built by the Greenville Construction Company, and a correspondent informs us that 500 tons of rails and a construction train have just been received.

Gulf, Colorado & Santa Fe.

The new board has begun suit in the District Court for Galveston County against the old management. The complaint sets forth the history of the company and asks for a writ of *mandamus* to compel the old directors and officers to deliver up possession of the property and of the books and accounts of the company, and to account for the funds expended by them.

The old officers resist on the ground that the new board was not legally elected and has no good title.

Hoosac Tunnel Line.

The little tunnel at North Adams has just been completed and has been a costly and troublesome piece of work. This arose from the fact that the relocation of the road at this point made it necessary to cut through the old tunnel at an angle, and a sort of skew arch of great size was necessary.

The Hoosac Tunnel itself may now be regarded as finished, the contractors for the east facade, McClellan & Sons, of Chicopee, Mass., having just completed their work. The intention at first was to leave the east opening as it was, but the rock scaled and fell so much that it was necessary to face the opening with masonry. The structure is of heavy masonry, plain but very substantial, with heavy wing-walls on both sides of the archway, the whole being about 60 feet long by 40 feet high, and extending the tunnel 25 feet beyond the original face of the rock.

The manner of running trains through the tunnel is thus described by the Springfield *Republican*: "Only one track is laid at present in the tunnel. The trains are run by telegraph, passenger trains being allowed 10 and freight 20 minutes to pass. Three lights, equi-distant, are affixed to the sides of the tunnel, dividing the distance into four sections. The lights are for the purpose of enabling the engineers to regulate their speed, and they are required to maintain a uniform gait the whole distance. At the central shaft two lights are displayed, to indicate when the summit is reached and the grade declines—which it does each way to afford drainage, being 60 feet lower at each portal than at the central shaft. As the trains plunge into the impenetrable darkness the time is recorded, and again when they emerge, by operators situated at either end of the tunnel, and forwarded to the general dispatcher at North Adams. The passage seldom varies a minute. The tunnel is never occupied by two trains at the same time, and no train is allowed to enter until the preceding train has made the exit. No equal distance of the road outside is traversed with so uniform speed, nor with so much safety, the track, which cannot be excelled, being perfectly straight. Frost does not disturb the road-bed, nor rain wash away the ballast, nor snow-drifts obstruct the way. It is a relief when the weather is cold or oppressive, when wind and storms prevail, or dust flies, to enter the tunnel, where the temperature is always nearly uniform. The roof of the tunnel is considered perfectly safe, not a piece the size of a walnut having been detached for a year, and about a mile and one-third of brick arching having been built to sustain all doubtful localities, in sections from 10 feet upward. Still, the roof is under constant examination by men on top of an elevated carriage, which is propelled along the road. Admittance to visitors is strictly denied. Occasionally the tunnel is so free from fog and smoke that, standing at the central shaft, daylight can be discerned at both portals, showing about ten feet in diameter; but usually light can be discovered in only one direction, that from which the wind comes, the current driving the smoke before it up the shaft, and leaving the other half of the tunnel motionless and usually dense with smoke and fog. A floor composed of oak, 14 inches thick, let into grooves cut into the rock on a steep incline, prevents any pieces detached from the sides of the shaft from falling onto the track. At the summit of the mountain the opening of the shaft is inclosed by a stone wall 20 feet high, thereby rendering inoperative the proposition humorously made by the late Alvah Crocker, while tunnel commissioner, to the farmers in mitigation of land damages—that he would so arrange that the Florida Mountain grangers could dump their cart-loads of potatoes into a chute down the shaft to a car stationed below and en route for a market."

Joliet & Northern Indiana.

At a meeting held in New York, Dec. 7, the bondholders decided not to accept the proposition made by the Michigan Central Company, lessee of the road, to issue new 7 per cent. bonds in place of the over-due bonds, principal and interest to be guaranteed by the lessee. A committee was appointed to confer with the lessee.

Kansas Pacific.

The Receivers give notice that they will pay, on presentation at the National Bank of Commerce in New York, the coupons due Dec. 1, 1877, on the bonds known as the Union Pacific Railway, Eastern Division bonds. They will also pay on and after Jan. 10, at the same bank, one-half of the amount of each coupon which matured Nov. 1, 1877, on the Denver Extension first-mortgage bonds.

The Receivers have published a circular containing the following statements for the year from Nov. 21, 1876, the date of their appointment, to Nov. 21, 1877:

Net earnings, Nov. 21, 1876, to Sept. 30, 1877		$1,086,664
Deduct Government transportation, for which no present compensation is received		161,289
Balance		$925,375
Net earnings for October, less Government business		187,353
Net earnings Nov. 1—21, less Government business		97,843
Available from open accounts, etc.		15,102
Total resources		$1,225,673
Payments on pay-rolls, etc. prior to Nov. 21, 1876	$612,084	
Less collections on old business	102,293	
Balance	$509,791	
Interest on Union Pacific, Eastern Division bonds and funding mortgage bonds, paid by order of Court	220,714	
Judgment for coupons, obtained by Stuttgart Committee	53,561	
Advances to Denver Pacific for May coupons	65,289	
Advances to Denver Pacific for November coupons	80,000	
		929,355
Balance		296,318

Most of this balance is in the form of amounts due from other companies and accounts still to be collected. The advances to the Denver Pacific were made by consent of all parties to the suit. It was deemed necessary, in the interest of all bondholders, that the exercise of the power under the funding mortgage to sell out immediately, after default, the numerous valuable assets of the company which it covered, should not be permitted, and this with special reference to the three-fourths of the stock of the Denver Pacific Company, which form part of these assets. By the sale of this stock upon default, the control of the Denver Pacific might have passed into other hands, which contingency would have rendered it impossible for the Kansas Pacific to enforce its right under the acts of Congress to pro-rate with the Union Pacific for the overland business, the enforcement being dependent upon the continuity of the line from Kansas City to Cheyenne. The prevention of the same contingency was likewise the motive for the aid extended to the Denver Pacific in the payments of its first mortgage interest. It is gratifying to record the fact that the judiciousness of this action is admitted by all parties in interest, as far as the Receivers are informed.

The circular also refers to the payments to be made on coupons not included under the funding arrangement, in order to put them on an equal footing with those included, as has been heretofore noted, and to the payments to be made on coupons hereafter, some of which are noted herewith. The business of the road in Kansas has much improved, but a loss on the Colorado business is feared from the opening of the new line between Denver and Cheyenne.

Long Island.

The Court has granted an application of the United States District Attorney for leave to sue the Receiver for taxes and penalties due the Government for three years past.

Maryland & Delaware.

A meeting of the bondholders was held in Boston, Dec. 6, at which a committee, consisting of Wm T. Hart, Samuel W. Bates and A. E. Hildreth, was appointed. The committee was instructed to represent the bondholders at the foreclosure sale, and to take such action as they may deem expedient to protect their interests.

Maysville & Lexington.

An attempt was made in New York last week to negotiate a number of bonds of the Maysville & Lexington Railroad, Northern Division, which were found on examination to be well executed forgeries. Several persons were arrested on the charge of being concerned in the forgery and were committed for trial.

Meetings.

Meetings will be held as follows:

Central of Georgia, annual meeting, at the banking house in Savannah, Dec. 13, at 10 a. m.

New York, New Haven & Hartford, annual meeting, at Loomis Hall, in New Haven, Conn., Jan. 9, at 11 a. m.

Colorado Central, annual meeting, at the office in Golden, Col., Dec. 20, at 2 p. m.

Missouri, Iowa & Nebraska.

This company has contracted for the use of the St. Louis, Keokuk & Northwestern track from Alexandria, Mo., to Keokuk, Ia., and also for the use of the Keokuk & Des Moines track as an entrance into the city of Keokuk. The company will build a freight house on the levee for its own use, and also an independent track leading to the freight house. The necessary land for these purposes is given by the city, in consideration of the transfer of the terminus from Alexandria.

Missouri, Kansas & Texas.

This company is now selling round-trip tickets from Chicago, St. Louis and Hannibal to Galveston and San Antonio at the following rates:

	From Chicago.	From Hannibal.	From St. Louis.
Galveston and return	$78 25	$61 50	$61 50
San Antonio and return	91 25	74 50	74 50

The tickets are first class and are good until May 1, 1878.

Montour Branch.

Much local interest is felt in this new road and an active canvass is being made for subscriptions. A committee has also been appointed to secure the right of way. The road is to be a branch of the Pittsburgh & Lake Erie, and that company offers to build it if the parties concerned will raise a reasonable amount. It will be about 10 miles long, and will have, it is claimed, a considerable coal business.

Mobile & Ohio.

In the matter of the appeal from the order for the sale of this road, the United States Supreme Court on Dec. 10 made the following order:

"On consideration of the motion to dismiss this appeal and of the argument of counsel thereupon had, as well on behalf of Hays, Pierson and Dupuy and Duncan and Elliott, in support of the motion, as of counsel against the same, it is ordered that said motion be and the same is hereby denied.

"And on motion of counsel for Hays, Pierson, Dupuy, Duncan and Elliott, it is further ordered that the operation of the *supersedeas* arising upon this appeal be so far suspended as to allow sale to be made of the mortgaged premises in pursuance of the decree below; and that the commissioners appointed to make the sale conduct the same in all respects as directed by the decree, except that the portion or share of the proceeds which would enure to the benefit of the appellants by the reversal of the decree, so far as it sustains the validity of the coupons of 1874, be paid in cash to the commissioners, and by them into the Registry of the Circuit Court for the Southern District of Alabama, to await the disposition of this appeal and the further order of the Court thereon."

New York & New England.

This company has begun to compete for business between Boston and Providence over its leased Rhode Island & Massachusetts road. It is now running three daily trains, two express and one accommodation, between the two cities, and sells round-trip tickets for $1.50, single fare on the Boston & Providence being $1.45. The distance (47 miles) by this line is three miles more than by the Boston & Providence, and the time is an hour and 45 minutes, some 25 minutes more, though the old road runs one train through in an hour.

Ohio & Mississippi.

Receiver King's report for the month of October is as follows:

Cash balance, Oct. 1	$15,470
Receipts from agents, conductors, other companies, etc.	470,048
Total	$485,518
Disbursements on all accounts	414,344
Balance, Nov. 1	$71,174

The receipts exceeded the disbursements by $55,704. The disbursements included $48,047 on accounts prior to the appointment of the Receiver.

Philadelphia & Reading.

Mr. Charles E. Smith, formerly President of this company, has made public a statement prepared by him over a year ago in the form of a report to the board of managers, of which he was then a member. This report, he says, was then suppressed and did not appear on the minutes, owing to the opposition of President Gowen and Mr. Borie. He himself did not publish the report at the time, not wishing to add to the existing troubles of the company. He claims that Mr. Isaac Hinckley and Mr. J. B. Lippincott acted with him on the committee which prepared the statement.

The statement is, briefly, that for the fiscal years 1871, 1872, 1873, 1874 and 1875 the net earnings of the company, deducting the loss on the Philadelphia & Reading Coal & Iron Company's business, was very much less than the amount paid in dividends, the figures being as follows:

Real earnings of the railroad and the coal and iron company for the five years	$2,347,680 37
Dividends paid by the railroad company	18,040,264 32
Actual deficit	$15,692,583 95

A second charge is that on two occasions a large amount of floating debt, in 1873, $1,597,000, and in 1874, $1,985,000, was transferred from the books of the railroad to those of the coal and iron company, and so concealed from the stockholders.

The third charge is that the company has pursued a wasteful system, and that, while the collieries worked by the company show a loss of $2,050,636, those leased show a profit of $1,755,192. These are minor points, however, the main charges being that the real condition of the company was concealed, and large dividends paid when none had been earned.

President Gowen is reported as saying that the publication of this report is merely a stock-jobbing operation, and that he is willing to stand by his published reports. It is probable that no formal answer will be made by the company until the publication of the annual report, which usually appears early in January.

Philadelphia & Atlantic City.

It is reported that a number of persons, who hold claims against this road for labor, have combined to prosecute them and will file a general lien against the road for their wages. Their further course is not fully decided upon, but they hope that the company will make some offer to pay or compromise their claims.

Pittsburgh & Castle Shannon.

This company has agreed to build a branch about 10 miles long from a point on its Washington Extension towards Morgantown, Pa. This section is to be completed by June next and the branch is hereafter to be extended to Morgantown.

Portland & Ogdensburg.

The expected fight between the ordinary and preferred first-mortgage bondholders of the Vermont Division has begun. The Mercantile Trust Company, of New York, for itself and other holders of bonds issued under the joint mortgage of the Lamoille Valley, the Montpelier & St. Johnsbury and the Essex County companies, forming the Vermont Division of the Portland & Ogdensburg, has begun suit in the United States Circuit Court at Burlington, Vt., to set aside the preferred mortgage and foreclose the first mortgage. The complaint alleges that the first-mortgage bondholders were induced to assent to the execution of the preferred mortgage by false and fraudulent representations that such action would enable the companies to complete the line and to resume payment of interest on all the bonds. The trustees, Luke P. Poland and A. J. Jewett, are charged with breach of trust, and the complaint asks for their removal.

Quebec, Montreal, Ottawa & Occidental.

Regular traffic on this line from the terminus at Hochelaga, near Montreal, to Ottawa began Dec. 1. The vexed question as to the entrance of the road into Montreal is still under discussion, with no apparent prospect of reaching a settlement.

Rochester & Northern Minnesota.

A survey has been completed for this projected line from Rochester, Minn., on the Winona & St. Peter road, northward to Zumbrota, about 30 miles. It is said that work will be begun on this section shortly.

Rome, Watertown & Ogdensburg.

A report is current that this company is considering the question of building a branch or extension to Montreal through Northern New York and Canada. It is said also that the New York Central will aid in this extension, its object being to secure a line to Montreal, in order to compete with the Grand Trunk for the business of that port.

Rumford Falls & Buckfield.

The directors have resolved to open books for subscription to the stock at once, in order to see what the people on the line are willing to do. In case a sufficient amount is subscribed the first work will be to repair and put in order the old Portland & Oxford Central road, which is to form part of the new line.

Southern Maryland.

A number of parties holding judgments against this company, having been unable to collect the same, have begun suit against persons who have subscribed to the stock, to collect the amount unpaid on the subscriptions. The suit is brought in the District of Columbia, and the complaint alleges that the company is utterly insolvent and that there is no prospect of collecting from it the amounts due; that the defendants have subscribed for a large number of shares, but have paid only a very small amount thereon. Judgment is asked for the balance due on these subscriptions. The company's debt is said to be about $100,000.

Southern Minnesota.

It is stated that arrangements have been completed to begin work early in the spring on the extension of this road from Winnebago City, Minn., westward 45 miles to Jackson. The country through which this extension will run includes much good wheat land and there are already many settlers located on the line, whose number will be largely increased when the road is built. The funds necessary to complete 20 miles of the extension are already secured and no difficulty is anticipated in raising the rest. A contract for ties has already been let to C. P. Hazeltine & Co., who are to get them out on the line of the Wisconsin Valley road this winter.

Springfield & Western.

This company has recently let contracts for the construction of 22 miles of road from Springfield, Mo., westward towards Greenfield; also for a locomotive and some construction cars. The company has been organized for a good while, but has done nothing heretofore.

Syracuse, Geneva & Corning.

Regular passenger trains began to run over this road between Geneva, N. Y., and Corning, 57 miles, on Dec. 10. The road is run in connection with the New York Central & Hudson River.

South Pacific Coast.

This road now has the track laid from Alameda, Cal., southward through Newark, Santa Clara and San Jose to Los Gatos, a distance of 53 miles. The only work remaining to be done on this section of the road is a short piece of track to the wharf at Alameda, from which the company's steam ferry boat will run to San Francisco. The road has been in progress about two years; it was originally intended to make the northern terminus at Newark and to run a steam ferry from that point to San Francisco, but it was finally decided to build to Alameda. The road is of 3 ft. gauge and is laid with iron rails 52 lbs. to the yard, made by the Pacific Rolling Mill in San Francisco. The cars are also made on the Pacific Coast, by Carter Brothers of San Francisco, and only the locomotives are of Eastern manufacture. The 20 miles of road from Newark north to Alameda have been built by a separate corporation, the Bay & Coast Railroad Company, but the ownership is the same and the South Pacific Coast Company will work the whole line. At Newark the company owns 4,000 acres of land and has established a town, which is growing rapidly; its repair shops are located at that point.

The stations on the line beyond Alameda are: San Leandro, Mount Eden, Alvarado, Newark, Alviso, Santa Clara, San Jose and Los Gatos. In Alameda the company has established several local stations and will run numerous trains in connection with its ferry, besides the regular trains running southward.

The company intends to build the road through to Santa Cruz, 22 miles beyond Los Gatos and 75 miles from Alameda. The terminus will be at Los Gatos for some time, however, for the first work beyond that town is a tunnel 6,000 feet long through the Santa Cruz Mountain, work on which is necessarily slow. The contract for this tunnel has been let to Martin, Ballard & Ferguson for $280,000, and it is to be completed next year. It is expected that the road from the tunnel to Santa Cruz will be finished about the same time.

Tennessee River Improvement.

A convention was held in Chattanooga, Tenn., Dec. 5, with a large attendance of delegates from Tennessee, Alabama and Georgia. Ex-Gov. Chapman, of Alabama, presided. Maj. W. R. King, United States Engineers, on request of the convention, submitted a statement as to present and possible improvements in the navigation of the river. Resolutions were adopted urging the improvement of the Upper Tennessee, especially at the Muscle Shoals, and setting forth the great importance of the work. A permanent Executive Committee was appointed to further the object of the convention; another committee to prepare a memorial to Congress, and a third to visit Washington and present the memorial there.

Texas & Pacific.

A new bill relating to this road has been introduced in Congress by Mr. Stephens, of Georgia. It provides for a Government guarantee of the company's bonds to the amount of $25,000 per mile for the main line from Fort Worth to San Diego, except on the mountain sections, where $35,000 per mile is allowed. The aggregate issue is not to exceed $38,750,000, and the Government is to be secured by first mortgage on the road and land grant. Authority is given for an extension east to the Mississippi by one or more branches. There are many minor provisions, but the bill will probably be much altered in committee before it is brought before the House.

Union Pacific.

The Ogden (Utah) *Freeman* says: "The Union Pacific Railroad Company on the 16th instant completed arrangements by which they obtain possession of all the coal mines at Coalville, by contracting with John Robinson, J. W. Farnsworth, Crismon & Co., the Wasatch Company, several mines at Grass Creek and all others, to supply the Union Pacific with all the coal that the different mines dig for the sum of $2 per ton delivered on the cars. This gives the railroad company a complete monopoly of the last independent coal mines between Omaha and San Francisco."

Vermont Valley.

It is reported that a compromise has been agreed upon in settlement of the difficulties between this company and the Central Vermont. The terms of the compromise, however, have not been made public, and it is said that the details of the agreement have not been fully settled as yet.

The matter has been so far adjusted that the Central Vermont has begun sending its through freight over the Valley road again. The trouble has affected only the freight business, passenger trains having continued to run as usual.

Western Union Telegraph.

At a meeting of the board held Dec. 12, the following statement for the quarter ending Dec. 31 was presented, November and December being partly estimated:

Surplus, Oct. 1		$90,865 71
Net earnings for the quarter		750,138 75
Total		$841,004 36
Interest on bonded debt	$112,000	
Sinking funds	20,000	
		132,000 00
Surplus		$709,004 36
A dividend of 1¼ per cent. requires		525,931 50
Leaving surplus		$183,072 86

On this statement the board resolved to declare the usual quarterly dividend of 1¼ per cent.

Worthington & Sioux Falls.

This road is now completed and in operation to Beaver Creek, Minn., eight miles west of the late terminus at Luverne, and 42 miles from the junction with the Sioux City & St. Paul road at Worthington. Regular trains began running to the new terminus on Dec. 10. About six miles remain to be built to reach the Minnesota State line, and 16 miles to reach the town of Sioux Falls, Dakota, and it is expected that this extension will be built next season. The road is built by parties interested in the St. Paul & Sioux City and the Sioux City & St. Paul roads, and it is intended to open to settlement a part of the land grant of those roads.

Wheeling & Lake Erie.

Mr. H. B. Willson, contractor for this road, has published a statement in which he charges President Robinson with issuing a considerable amount of the company's bonds without the knowledge of the directors or of the contractor and against the agreement with the latter. Some of these bonds were issued for old claims and others given to Darragh & McKee, former contractors, in order to prevent them from suing for damages for breach of contract. Mr. Willson declares that these issues have prevented him from negotiating bonds held by him and from raising money to go on with the work.

ANNUAL REPORTS.

Naugatuck.

This company owns and operates a line 57 miles long, from Stratford Junction, Conn., northward to Winstead, and its trains run over four miles of the New York, New Haven & Hartford track, from Stratford Junction to Bridgeport. It furnishes train service under contract to the Watertown & Waterbury road, 4½ miles. The latest report is for the year ending Sept. 30, 1877.

The balance sheet at the close of the year was as follows:

Capital stock ($35,088 per mile)		$2,000,000 00
Accounts and balances payable		29,693 01
September expenses		22,385 63
Profit and loss		311,831 80
Total ($41,472 per mile)		$2,363,910 44
Construction and equipment ($37,946 per mile)	$2,162,931 77	
Real estate	35,412 79	
Stocks, bonds, etc	43,329 90	
Accounts and balances due	47,302 80	
Materials on hand	68,569 20	
Cash	6,364 18	
		2,363,910 44

The company has no funded debt and no floating debt beyond the usual current balances.

The train mileage for the year was as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passenger	100,919	85,046	Inc.. 15,873	18.7
Freight	126,035	134,410	Dec.. 8,373	6.2
Other	31,763	28,976	Inc.. 2,787	9.6
Total	258,717	248,432	Inc. 10,285	4.1

The earnings for the year were as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers	$176,972 66	$187,502 74	Dec.. $10,530 08	5 6
Freight	301,653 60	284,893 64	Inc.. 16,759 96	5.9
Mails and express	17,094 10	18,133 50	Dec.. 1,009 40	5.6
Miscellaneous	7,946 61	11,104 98	Dec.. 3,158 37	28.5
Total	$503,666 97	$501,604 86	Inc.. $2,062 11	0.4
Working expenses	275,739 64	276,304 81	Dec.. 565 17	0 2
Taxes	20,167 95	19,215 36	Inc.. 952 59	5.0
Total	$295,907 59	$295,520 17	Inc.. $387 42	0.1
Net earnings	$207,759 38	$206,084 69	Inc.. $1,674 69	0.8
Gross earn. per mile	8,836 26	8,800 03	Inc. 36 23	0.4
Net earn. per mile	3,644 90	3,615 53	Inc.. 29 37	0.8
Per cent. working expenses	54.75	55.08	Dec.. 0.33	0.6
Per cent. all expenses	58.75	58.91	Dec.. 0 16	0.3

The income account was as follows:

Balance, Sept. 30, 1876	$276,512 42
Net earnings	207,759 38
Premium on capital stock	24,480 00
Total	$507,751 80
Dividends, two of 5 per cent each	195,920 00
Balance, Sept. 30, 1877	$311,831 80

The report says: "All the bonded debt of the company has been extinguished, and the property of the company is free from all incumbrances. During the fiscal year the portion of the line above Waterbury has been relaid with steel rails, thus making the entire line of steel rails. The construction and equipment account has been charged with the amount of $106,080 on account of cost of steel rails, fish plates, spikes, etc. The balance of the cost of these materials and the extraordinary labor required to lay them down has been charged into current expenses. The above amount of $106,080 so charged to account of construction and equipment was realized from the balance of unissued capital stock of the company. The capital stock of the company now amounts to just $2,000,000, against $1,918,400 at the termination of the previous fiscal year.

"The net earnings from the operations of the road have been sufficient to pay the taxes and dividends, and leave a small balance to go to profit and loss account.

"The stockholders will observe that the balance to credit of profit and loss account, or surplus, is all invested in outstanding accounts, materials on hand, real estate, etc., and is not therefore available for dividends. It is always necessary that we should have about this amount in this situation, thus absorbing a large amount of capital."

New York & New England.

This company owns and operates the following lines:

	Miles
Main Line, Boston to Willimantic, Conn.	85.75
Woonsocket Division, Brookline, Mass., to Woonsocket, R. I.	33.75
Dedham Branch, to Dedham, Mass	2.03
Southbridge Branch, Putnam, Conn., to Southbridge, Mass	17.50
Total	139.03
Rhode Island & Massachusetts R. R., leased, Franklin, Mass., to Valley Falls, R. I.	14.00
Total	153.03

The Rhode Island & Massachusetts road, which completes a new line from Boston to Providence, was not completed until just at the close of the fiscal year. The company works under lease the Norwich & Worcester road from Worcester, Mass., to Allyn's Point, Conn., 66.4 miles, but the accounts are kept separately. The company also claims a right to take possession of the Hartford, Providence & Fishkill road, which has 122.37 miles, from Providence, R. I., to Waterbury, Conn., in operation and 76 miles more, from Waterbury to Fishkill, N. Y., partly done, on providing for its bonded debt of $2,055,000; but that road is held and worked by trustees for the benefit of its bondholders.

The present company was formed in 1873 as successor to the Boston, Hartford & Erie, and came into possession through foreclosure of the so-called Berdell mortgage for $20,000,000. Its report for the year ending Sept. 30, 1877, covers the 139.03 miles owned and worked during the year.

The equipment consists of 31 locomotives; 62 passenger and 13 mail and baggage cars; 144 box, 133 platform, 161 coal, gravel and other cars. The passenger equipment is provided with train brakes and the Miller platform and coupler.

The general balance sheet is as follows:

General stock actually issued ($40,932 per mile)		$5,695,000 00
Berdell bonds not yet converted into stock		14,305,000 00
Total ($143,854 per mile)		$20,000,000 00
First mortgage 7 per cent. bonds ($2,704 per mile)		376,000 00
Notes of 1876		423,000 00
Notes, bills and balances payable		219,453 90
October account		62,096 33
Profit and loss		132,572 67
Total ($152,579 per mile)		$21,213,122 90
Road and equipment ($151,954 per mile)	$21,126,183 36	
Balances due	25,106 25	
Supplies and materials	54,012 43	
Cash	7,820 86	
		21,213,122 90

The road and equipment account is made up by adding to the amount of the Berdell bonds the amount expended by the present company in clearing off underlying liens and in improvements and new equipment. This account was increased by $59,950.04 during the year, $71,200.04 having been expended, from which is deducted $11,250 of Receivers' certificates paid off from funds held by the former Receivers. The company has executed a new mortgage for $10,000,000, but has issued only the few bonds noted above. The State of Massachusetts holds $3,600,000 of the stock.

The earnings of the road for the year were as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers	$421,147 09	$436,637 53	Dec.. $15,490 45	3.5
Freight	477,899 77	447,385 27	Inc.. 30,014 50	6.7
Mails and Express	52,554 54	44,287 69	Inc.. 8,276 65	18.7
Miscellaneous	25,673 65	72,171 77	Dec.. 48,498 12	67.2
Norwich & Worcester lease	35,552 00	.....	Inc.. 35.552 00	....
Total	$1,010,336 24	$1,000,482 26	Inc.. $9,854 58	1.0
Working expenses and taxes	770,684 70	737,469 72	Inc.. 33,214 78	4.5
Net earnings	$239,652 14	$263,012 34	Dec.. $23.360 20	8.9
Gross earn. per mile	7,267 04	7,197 71	Inc.. 69 33	1.0
Net earn. per mile	1,723 74	1,892 18	Dec. 168 44	8.9
Per cent of exps..	76.28	73.71	Inc.. 2.57	3.5

The income account for the year was as follows:

Net earnings		$239,652 14
Interest on bonds, notes and loans	$68,486 16	
Rent of Boston property	55,268 77	
Discount on bonds	12,000 00	
Sundry accounts charged off as of no value	33,375 61	
		169,130 54
Surplus for the year		$70,521 60
Add balance, Oct 1, 1876		62,051 07
Balance, Oct. 1, 1877		$132,572 67

The gain in gross receipts was made in spite of a reduction in rates on the steamboat business to New York, caused by competition between the different lines. Expenses were increased by the depreciated condition of the road, owing to neglect of maintenance and renewals by the old company. The legal expenses were also large, on account of litigation necessary to settle vexed questions arising out of the foreclosure of the Berdell mortgage.

During the year 1,445 tons of steel and 319 tons of new and re-rolled iron rails were laid in the track. Seventeen small bridges were built to replace old ones worn out. Two new passenger cars were built in the company's shops.

The affairs of the company have been investigated by the Board of Railroad Commissioners under instructions from the Legislature. A special committee has also been in session from time to time, and has prepared a report to be submitted to the next Legislature of Massachusetts with respect to the proper policy to be adopted in view of the large interest in the company owned by the State.

Owing to various causes, among which is the uncertainty as to the action of the State, it has not been possible to sell the new bonds at a fair price, and the board has not felt justified in urging their sale. The board desires to impress strongly upon stockholders the necessity of securing possession of the Hartford, Providence & Fishkill road. The sale of $4,000,000 of the new bonds would enable the company to discharge the mortgages on that road and secure full possession, and also to discharge all other incumbrances on its own present property. After the two roads have been united a further expenditure of $3,000,000 would complete the unfinished section between Waterbury and Fishkill. The company would then have a debt of $7,000,000 and 345 miles of road, which would, it is believed, earn not only interest on the debt, but in time fair dividends upon the stock. The Hartford, Providence & Fishkill, in its present condition, earns more than enough to pay interest on its debt of $2,000,000. To secure these results united action by the stockholders is necessary, and the State, which is the largest stockholder, must do its part.

Providence & Springfield.

This road runs from Providence, R. I., westward to Pascoag, 22.8 miles. It passes through several manufacturing villages and does a good freight business, besides having a considerable suburban traffic. The following report for the year ending Sept. 30, 1877, was presented at the recent annual meeting.

The report says: "We have charged construction account during the year with $24,181.64, of which $22,683.18 is for land claims previously unsettled. The track and rolling stock have been kept in good repair. All claims against us have been promptly met and the interest on our bonds has been promptly paid. We close the year in a sound condition, with a floating debt of only $4,733.34, and unsettled land claims amounting to about $2,380, as per commissioner's award. We have on hand in bonds not issued $25,000, and $15,134.47 in cash."

The earnings for the year were as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers	$37,021 41	$40,366 84	Dec.. $3,345 43	8.3
Freight	48,995 41	42,952 64	Inc.. 6,042 77	14.1
Express and mails	2,922 56	3,248 69	Dec.. 326 13	10.0
Total	$88,939 38	$86,568 17	Inc.. 2,371 21	2.7
Expenses	46,015 05	45,409 11	Inc.. 605 94	1.3
Net earnings	$42,924 33	$41,159 06	Inc.. $1,765 27	4.3
Gross earnings per mile	3,900 85	3,796 74	Inc.. 104 11	2.7
Net " " "	1,882 65	1,805 22	Inc.. 77 43	4.3
Per cent. of expenses	51.74	52.45	Dec.. 0.71	1.4

The report says: "The expenses have been reduced as much as possible, and as small a force employed as could run the road successfully and safely. The passenger traffic has fallen off a little, but the deficiency caused thereby has been more than made up by the increase in the receipts from freight. The net earnings were $42,924.33, and the gross income is $2,371.21 in excess of the year previous.

"What the road needs most is better terminal facilities at Providence. We are very much cramped for room to accomodate the steadily increasing freight business. What little room we have is too far from the business portion of the city. Our track ought to be extended at least as far as the Hartford freight house, and we hope that, before the close of the present year, the city will enable us to do this."

James River & Kanawha Canal.

This company owns a canal extending from Richmond, Va., westward through the valley of the James River to Buchanan, 148 miles. The stock of the company is $12,400,000 of which $10,400,000 are held by the State of Virginia. There is also a considerable bonded debt, interest on which is in arrears.

For the year ending Sept. 30 the earnings and expenses were as follows:

	1876-77.	1875-76	Decrease.	P.c.
Income from tolls, rents and Richmond dock	$140,766 09	$153,023 85	$12,257 76	8 0
Expenses	74,337 18	80,786 08	6,448 90	8.0
Net earnings	$66,428 91	$72,237 77	$5,806 86	8.0
Gross revenue per mile	951 12	1,033 94	82 82	8.0
Net " "	448 84	488 09	39 25	8.0
Per cent. of expenses	52.81	52.79	.....	...

The tonnage moved on the canal was in 1876-77, 164,391 tons; 1875-76, 191,424 tons; decrease, 27,033 tons, or 14.1 per cent. This decrease was due chiefly to unusual interruption by ice and to the bad break caused by the freshet of September, 1876, which took two months to repair. The ice blockade lasted over a month. There was also some loss from a short tobacco crop and light demand for iron ore.

The report refers at some length to the Buchanan & Clifton Forge Railroad, which is to connect the canal with the Chesapeake & Ohio Railroad. The grading of this line is more than three-fourths done, convict labor being used, and it is believed that it can be finished for $500,000. The Canal Company has subscribed $400,000 to the stock, of which $151,500 was allowed for land, masonry and earthwork belonging to the proposed extension of the canal west of Buchanan; $123,500 was paid in third-mortgage canal bonds, and $125,000 is yet to be paid. The only other stock subscriptions to the road have been in the form of right of way, for which stock to the amount of $12,600 has been issued. Further aid for the road is to be asked from the State, and also from the city of Richmond.

At the recent annual meeting the directors were authorized to ask such aid for the road, and to dispose of the remaining second-mortgage bonds of the canal to assist in building the road. Also to settle differences existing with the Rivanna Navigation Company, and, if necessary to that end, to lease the property of that company.

New York & Oswego Midland.

The following figures are from the annual report made by the Receivers to the New York State Engineer for the year ending Sept. 30, 1877. The road owned and worked is the main line from Middletown, N. Y., to Oswego, 249 miles; the Ellenville Branch, 4.5 miles; the Delhi Branch, 17 miles, and the New Berlin Branch, 22 miles, making 292.5 miles in all. The Western Extension, 78.5 miles, included in previous reports, is omitted this year, having been sold under foreclosure of its separate mortgage. Its absence does not seem to have made any particular difference in the receipts.

The stock and debt at the close of the last two years were:

	1877.	1876.
Capital stock paid in	$6,800,522 29	$6,800,522 29
Funded debt	16,073,500 00	16,073,500 00
Floating debt	6,513,853 36	6,498,501 98
Total	$29,387,875 65	$29,372,524 27
Cost of road and equipment	26,284,394 94	26,228,408.93

The funded debt is $54,952 and the floating debt $22,242 per mile; total stock and debt $100,470 per mile; cost of road and equipment, $89,861 per mile.

The passengers and freight carried were:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers carried	249,138	234,870	Inc.. 14,268	6.1
Tons freight moved	222,507	228,103	Dec.. 5,596	2.5

The earnings for the year were as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers	$133,908 39	$114,708 32	Inc.. $19,200 07	16.7
Freight	371,990 83	354,207 20	Inc.. 17,783 63	5.0
Other sources	62,304 55	66,929 76	Dec.. 4,625 21	6.9
Total	$568,203 77	$535,845 28	Inc.. $32,358 49	6.0
Working expenses	530,164 35	486,699 43	Inc.. 43,464 92	8.9
Net earnings	$38,039 42	$49,145 85	Dec.. $11,106 43	22.6
Gross earn. per mile	1,942 58	1,444 33	Inc.. 498 25	34.5
Net " " "	130 05	132 47	Dec.. 2 42	1.8
Per cent. of expenses	93.31	90.83	Inc.. 2.48	2.7

The net earnings were 0.237 per cent. on the funded debt, or 0.168 per cent. on the total debt. The road has, however, done a little better in gross earnings than last year, though the expenses show a considerable increase, sufficient, indeed, to cause a falling off in net earnings.